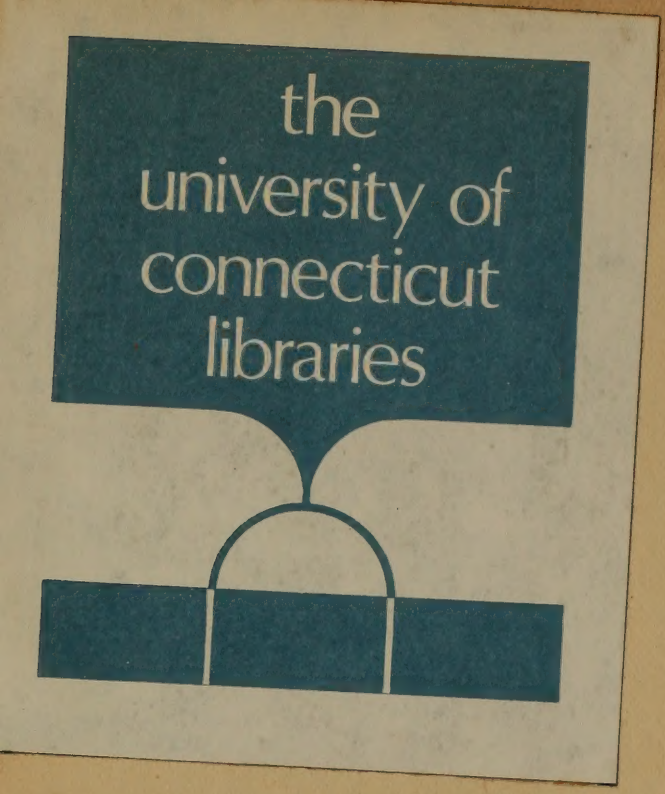

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REPORT

OF THE

BOARD OF EDUCATION

OF THE

State of Connecticut

TO THE GOVERNOR

TOGETHER WITH

The Report of the Secretary of the Board

HARTFORD, CONN.
Press of The Case, Lockwood & Brainard Company
1899

MEMBERS

OF THE

State Board of Education

1899

GEORGE E. LOUNSBURY, Governor	Ridgefield
LYMAN A. MILLS, Lieut.-Governor	Middlefield
WILLIAM G. SUMNER	New Haven
EDWARD D. ROBBINS	Wethersfield
ANTHONY AMES	Danielson
GEORGE M. CARRINGTON	Winsted

SECRETARY OF THE BOARD

CHARLES D. HINE, Hartford

OFFICE

Room 42, Capitol, Hartford

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REPORT

OF

THE BOARD OF EDUCATION

TO THE GOVERNOR

I. HIGH SCHOOLS AND HIGH SCHOOL PRIVILEGES

The law of 1897 which allows pupils who live in towns where there is no high school to attend such school in another town, promises to have more important effects than were expected. It is a very important improvement in the whole school organization of the State, and in the whole educational system, including the university. Since it is possible for every pupil to obtain a high school education, we shall soon be in a position to make arrangements at the Normal Schools which have not hitherto been possible, because allowance had to be made for pupils who had not had high school opportunities. This will lead to a greatly improved organization in the Normal Schools. The whole school system, including the relations of the grammar and high schools, will also admit of better organization, and the question will present itself, How can we adjust the school system to the university so that advance from the former into the latter may be made simple and direct for such pupils as desire to obtain a university education? In this connection the interest of women is to be especially remembered. It is more and more the case every year that the higher teaching positions are open only to those women who have taken a college course, with graduate study and a graduate degree.

One of the strongest arguments for a free school system is that, by offering opportunities to all, it is constantly operating a natural selection on the whole rising generation, as a result of which the best powers which the community possesses are developed for its service. When this point is considered, it is seen that the arguments against high schools and universities which are sometimes made, on account of the comparatively small number who attend them, are short-sighted and destitute of point. It is in the nature of the case that if boys and girls take as much of the education offered as they (or their parents) choose, the great body of them will drop off at the end of the grammar school or earlier, or after a year or two of the high school. We have no other way of judging how much education a child is worth than to accept as a criterion the amount which he takes. The great evil and the abuse of the free system lie in the fact that so little is taken by the great body of children out of the opportunity which the munificence and enlightenment of the State has offered. In this connection attention should be called to the remarks of the Secretary of the Board on page 154*. The taxpayer is compelled by law to provide all the opportunities and facilities of education, but there is great tenderness about compelling the children to come and take it.

If, then, the numbers diminish rapidly as we go up to the higher stages of education, it is no more than what we must expect in the nature of the case; but, after due allowance is made for individual good or ill fortune, those who go on up to the top contain the best there were in a generation of school children. They are the ones who are worth the most to the community by virtue of ability and character, and the expense of training them is the best investment there is in the expenditure on the schools. For this reason, both for boys and girls, the path should lead straight and easily out of the high schools into the universities, for such as desire to follow it. How real and practical this conveneince would be is shown by the fact that 127 boys and 44 girls went to college from the schools in 1898. The number will increase.

If anyone doubted the wisdom of the law of 1897 his doubts should be set at rest by the facts about the numbers who have taken advantage of it. If there were 136 young persons in the State who wanted a high school education and were so situated that they could not get it, who will say that it was not worth while to give them a chance to get it? The cost of giving it to them was $2,315.96. In general such pupils have to secure the opportunity, after it is open to them, at considerable expense and inconvenience.

If the views above presented are accepted as sound, we must turn with new zeal to the study of the question whether we can improve the high schools and make them worth more. In fact, it is evident that the place and meaning of a high school in the total system of education, and in respect to the requirements of practical life, demand broad study. As is stated below (page 150) the high schools contain one-twentieth of the pupils in the schools of the State, and there is expended on them one-sixth of all the money expended for schools. In part, this state of things is accounted for and justified by the facts which have been stated above about the diminishing numbers in the higher grades. It is further accounted for and justified by the fact that the cost of education per scholar is very much greater in the higher grades. The apparatus of education, libraries, laboratories, etc., is very much greater. It is larger and more costly every year.

It is when we turn to the course of study of the high schools that we meet with facts which are not so easily disposed of. The percentage of teaching and time given to the different subjects is as follows :

Dead languages	36 per cent.
Mathematics	20 " "
English	10 " "
History	8 " "
Science	10 " "
Modern languages . . .	6 " "
Miscellaneous	10 " "

The proportion given to dead languages deserves very serious attention. The proportion to modern languages and English will raise very serious questions of wisdom and expediency. If the closer relations between the school system and the university which we have advocated above is to be brought about, the university authorities will find themselves face to face with a new responsibility for the place which they assign to dead languages, for they will be constraining and injuring the school system so far as it must be adjusted to their requirements. Who can say that the loss which those suffered who had not high school opportunities, before the law of 1897 was passed, consisted in not being able to learn Greek and Latin? It must not, however, be believed, that the place occupied by dead languages in the above table is due to the necessity of fitting pupils for college. The high schools in the large cities do most of that work, and they bring down the average of teaching time given to dead languages rather than raise it, because their curriculum includes so many other subjects. The predominance of dead languages seems to be due to the value and prestige which teachers who have had a university education have been led to give to those studies. The question whether the place still assigned to dead languages in university education is consonant with modern requirements or not, is not a question for universities alone. It affects the whole educational system. It does not belong to us or to this place to enter upon the details of the question, what the high school course should be, but we are prepared to express the opinion that it ought to offer far more training in the oral and written use of the English language and more instruction in English literature, modern languages, science and history, and that the time given to the dead languages should be curtailed accordingly.

TOWN MANAGEMENT OF SCHOOLS

II. The town consolidation system has reached a far more advanced stage than the high school system. Thir-

teen towns adopted consolidation in 1897 and fourteen in 1898. The whole number which has now adopted it is eighty-one. The whole number of towns in which a system of transporting pupils to the central schoolhouse has been adopted is 44. Interesting remarks in regard to the result of this experiment will be found in the table on page 142.

EDWARD D. ROBBINS
ANTHONY AMES
GEORGE M. CARRINGTON
WILLIAM G. SUMNER

REPORT OF THE SECRETARY.

To the Board of Education of the State of Connecticut:

Your Secretary respectfully submits his fifteenth annual report.

This report covers the period from July 14, 1897, to July 14, 1898.

The report is arranged under the following heads:

1 School System
2 Diagrams and Tables
3 General Statistics
4 Financial Statement
  (*a*) Receipts
  (*b*) Expenditures
5 Scholars
  (*a*) Enumeration
  (*b*) Registration
  (*c*) Attendance
  (*d*) Reports of Agents
  (*e*) Enforcement of Attendance Law
  (*f*) Enforcement of Labor Law
  (*g*) Prosecutions
6 Teachers
  (*a*) Teachers' Meetings
  (*b*) State Examinations
  (*c*) Holders of State Certificates
7 Schools
  (*a*) Normal Schools
    1 New Britain
    2 Willimantic
    3 New Haven
  (*b*) High Schools
  (*c*) Evening Schools
  (*d*) Kindergartens
  (*e*) Schools at County Homes
  (*f*) Private Schools
  (*g*) Arbor Day
8 Schoolhouses and Libraries
  (*a*) School Libraries
  (*b*) Public Libraries
9 Town Management
10 Small Schools Transportation
11 Free Text Books
12 Condition of Schools

The Appendix contains:

  (*a*) Receipts
  (*b*) Expenses
  (*c*) Scholars
  (*d*) Teachers
1 Statistical Tables, 1897–8
  (*e*) Schools
  (*f*) Schoolhouses and libraries
  (*g*) Enumeration for 1897
  (*h*) Amounts paid for libraries
2 Questions used at state and normal school examinations
3 Report on high school courses
4 List of school visitors

Connecticut School System

SCHOOLS

The statutes require that every town shall maintain schools thirty-six weeks in a year. These schools should be taught by duly qualified teachers. The subjects which must be taught are reading, spelling, writing, English grammar, geography, and arithmetic, and such other studies, including

elementary science and training in manual arts, as may be prescribed by the board of school visitors. The nature of alcoholic drinks and narcotics is also a branch of instruction.

There are 168 towns in the state and seven independent and consolidated districts. The returns for the year 1897–8 show 1,110 public schools with a single teacher, and 437 schools with two or more teachers. In the school year 1897–8 these schools were in session 188 days, or 9 months and 8 days.

ORGANIZATION

There are two systems of organization and management, the district system and the town system. The town system originally prevailed, and was not fully superseded by the district system until 1837. In 1866 the law authorizing towns to reassume the management and control of schools was passed.

There are 81 towns under the town system, and 87 towns still operating under the district system.

Under the town system a town school committee is directed to maintain good schools in different parts of the town, to manage the property of the town pertaining to schools, to determine the number and qualifications of the scholars, to designate the schools to be attended by the scholars, and to examine, employ, and dismiss the teachers. This committee must also organize, classify, and manage the schools and have charge of schoolhouses. They have, in fine, all the powers necessary to secure good teachers, provide good teaching, and make good schools. The towns operating under this system have advanced rapidly, and have in general better schools than the towns under the district system. This system has the great advantage that it encourages and compels prompt action in the interest of good schools.

The district system is prevalent in 87 towns. There is a dual control, consisting of a Board of School Visitors and a prudential or hiring committee. To the former is entrusted the examination of teachers and the visitation of the schools. To the latter is entrusted the hiring and paying of teachers and the furnishing of schoolrooms. This dual control breeds confusion, and, in many places, has been the direct cause of the decline of interest in the best education of children. The visitors can exercise a supervisory power, but they can neither discharge the teacher nor make beneficial and enforce-

able regulations. The teachers are left without support and without supervision. There is in this system also an entire rejection of all business principles in separating the functions of the employer and manager.

The tendency in all smaller towns is toward the union of schools and the better system of town management. In forty-four towns eighty-four schools were closed. Eight hundred forty-nine children were conveyed to and from school at an expense of about $12,000.

There is a Board of Education, consisting of the Governor, Lieutenant-Governor, and four members appointed by the Legislature to serve for four years. This board does not receive any compensation. It appoints a secretary and agents, manages the normal schools, holds teachers' meetings, has charge of the schools in the Temporary Homes, approves high schools, enforces the laws relating to labor and attendance, and establishes and assists school libraries.

NORMAL SCHOOLS

There are in the state three normal schools, located at New Britain, Willimantic, and New Haven. These schools are managed by the State Board of Education, which appoints and pays the teachers. The annual appropriation for the three is $60,000.

Those who enter must be seventeen years of age, and must pass a satisfactory examination. The course necessary for graduation covers two years. In two of these schools at least five months must be spent in practice. There are 534 students in attendance.

HIGH SCHOOLS

Any town may maintain a high school, but no town is required to maintain one. High schools are divided according to the provisions of the law under which they are organized into town high schools, district high schools, and high schools in consolidated towns. Fourteen towns under the district system, thirty-one towns under the town system, and thirty-one districts maintain high schools.

The studies in these high schools are prescribed by the local supervisory board and may include any subject which this board introduces.

Any town whose valuation does not exceed $900,000 may

receive from the treasury of the state a sum not exceeding $20 per scholar for all children who attend non-local high schools.

EVENING SCHOOLS

Any town or city may, and every town and city of ten thousand or more inhabitants must, maintain evening schools. Upon proper representation the State Board of Education may relieve towns from the provisions of the law. During the past year two towns were thus relieved.

ATTENDANCE

The law requires parents and those who have the care of children to cause all children over 8 and under 14 years of age to attend a public day-school during the days and terms that this school is in session.

No teacher or school officer has legal authority to grant excuses for absence. There are, however, legal excuses which may be pleaded in the courts. These are, mental or physical disability, lack of clothing, and attendance at a private school.

The private school must be held during the hours and terms that the public schools are in session and must be open at all times to the inspection of the agents of the State Board of Education.

Compulsion is both direct and indirect. Direct compulsion imposes upon parents the duty of sending their children to school regularly and constantly under penalty for failure. Indirect compulsion is found in the law prohibiting labor. No child under fourteen years of age can be employed in any mercantile, mechanical, or manufacturing establishment. Any person acting for himself or as an agent in any such establishment, who shall employ, or permit to be employed, any child under the prescribed age can be fined not more than $60.00. This provision has been most beneficial in its operation, and has secured the attendance at school of thousands of children who otherwise would not have received any education. The laws relating to attendance and labor are enforced by officers of the State Board of Education. These officers obtain the school census and the registers of the schools, and by comparison find the names of those who have escaped registration. They also investigate the causes of irregular attendance. In all cases they bring the

pressure of the law to bear upon the parties who are responsible for the children's absences.

TEACHERS

There are employed in the state 3,941 teachers, and of these 385 are men and 3,556 are women. About 1,400 have attended a normal school, and 200 have completed courses at local training schools.

School visitors and other school officers of like powers can examine teachers, ascertain their qualifications, and issue certificates. These certificates are valid only in the town for which they are issued. The State Board of Education can examine teachers and issue State certificates which may be accepted in lieu of local examinations.

In many, perhaps most, cases, superintendents and town school committees engage teachers and allow them to enter school without anything like a formal examination. Under the district system the committee hires the teacher and forwards him to the school visitors for examination.

A district committee elected for a year cannot make a contract extending beyond his term of office. The result is that teachers must be re-hired from year to year, and are subject to all the annoyances of constant change.

The State Teachers' Association includes in its membership teachers from every grade of public school and from private schools. The meetings are held annually in October, either at Hartford or New Haven.

Hartford County has a flourishing association which holds three or four meetings annually.

Fairfield County has also an influential and active association. There is an annual meeting in May.

There is also the Eastern Connecticut Association drawing teachers from Tolland, Windham, and New London counties. This association is strong and its meetings have been largely attended.

The Council of Education was organized in November, 1887, to discuss legislation and questions of educational policy. The meetings are held twice in the year, and the exercises consist of addresses with discussions.

Other educational associations are the State High School Teachers' Association, and the Schoolmasters' Round Table of Western Connecticut.

Under the direction of the State Board of Education fifty Teachers' Institutes, continuing a day and evening, have

been held during the past year in various parts of the State. In these meetings detailed instruction on the various school subjects is given. The evening meetings are intended to interest the people and to deal with the subjects of school management and organization.

SUPERVISION

The supervision of schools is committed to the school visitors, and the law requires two visits in a term by the acting visitor. The law authorizes the appointment of superintendents and supervising principals. In most towns there is no influential supervision.

BUILDINGS

All plans of new buildings must be approved by the board of school visitors. Usually buildings are constructed by local committees. In the past 9 years $2,765,449.57 have been expended for school buildings.

SCHOOL LIBRARIES

Every district can obtain from the state five dollars or a larger sum based upon the registration of school. The condition is that the district raise and expend a sum equal to the state grant.

There has been a rapid increase in school libraries, the number advancing from 364 in 1890 to 743 in 1898. There is great interest in the selection of books and these libraries have a decided influence in the schools.

FREE PUBLIC LIBRARIES

If a town votes $200 or less for the establishment of a free public library, the state will grant an equal amount in books; and if the town votes to spend $100 or less annually for the maintenance and increase of the public library, the state will grant an equal amount in books annually.

Under this liberal provision forty-six free public libraries have been organized. In many cases libraries had been in existence as subscription libraries and took advantage of the law to organize so as to receive state aid. The rapid increase in free public libraries is doubtless due to the creation of the Public Library Committee in 1893.

In some towns special arrangements are made by which books are supplied to the schools by the public libraries.

DIAGRAMS

In addition to the customary analysis of the educational results of the current and previous years, which here follows, we present eight tables giving a summary of the general statistics, and eight diagrams, which are intended to show the most interesting facts in connection with the growth and progress of education in Connecticut during the last twenty years.

DIAGRAM I

SCHOOLS

1. Number of Schools. 2. Number of Departments

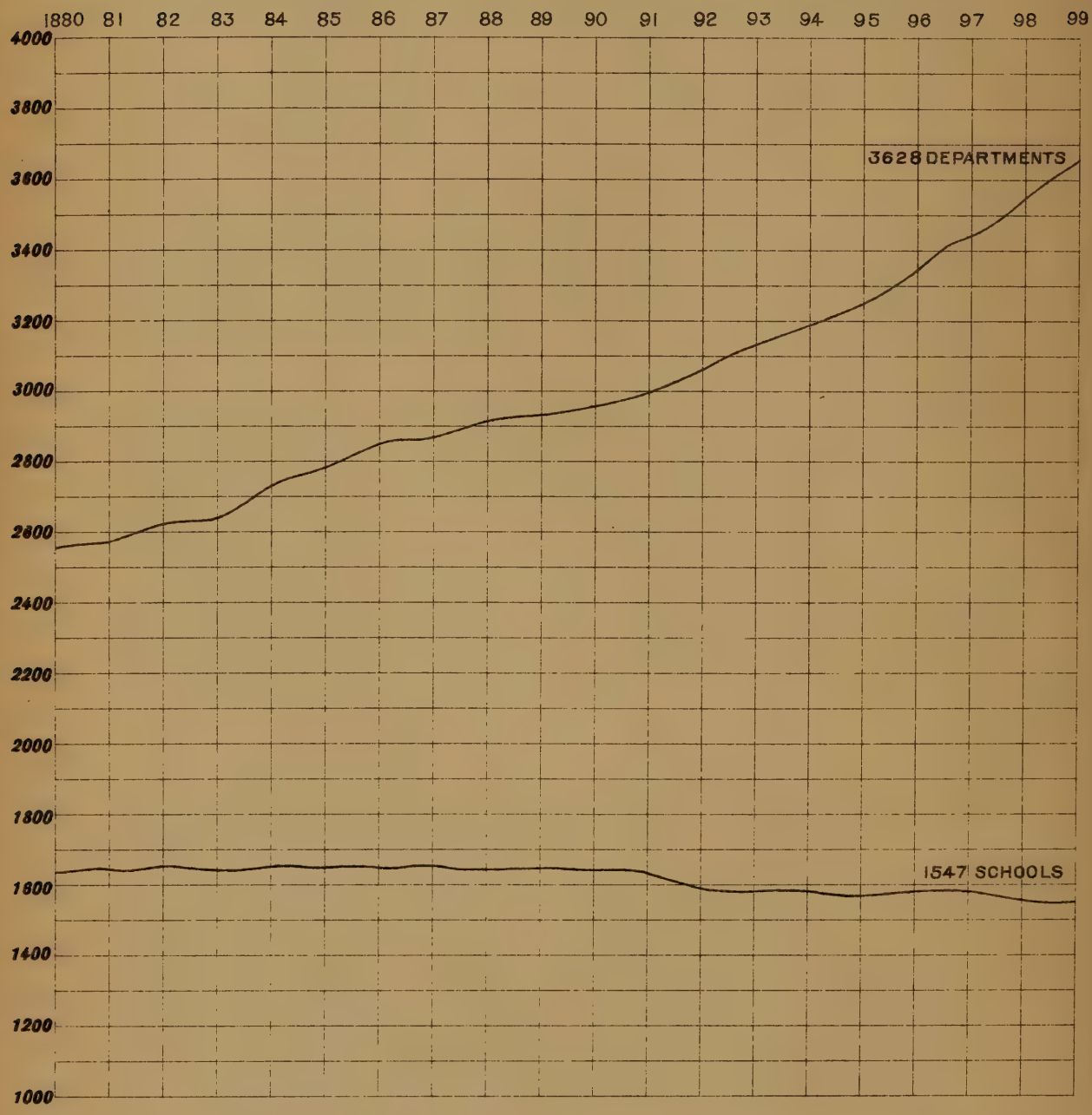

TABLE I

SCHOOLS

Number of Schools
Number of Departments

Report of	No. Public Schools	No. of Departments
1880 . . .	1,638	2,571
1881 . . .	1,630	2,594
1882 . . .	1,634	2,627
1883 . . .	1,628	2,649
1884 . . .	1,634	2,735
1885 . . .	1,639	2,779
1886 . . .	1,633	2,837
1887 . . .	1,631	2,860
1888 . . .	1,628	2,903
1889 . . .	1,624	2,921
1890 . . .	1,629	2,969
1891 . . .	1,611	2,994
1892 . . .	1,599	3,057
1893 . . .	1,594	3,131
1894 . . .	1,584	3,171
1895 . . .	1,561	3,236
1896 . . .	1,577	3,338
1897 . . .	1,563	3,436
1898 . . .	1,554	3,511
1899 . . .	1,547	3,628

Length of School in Days

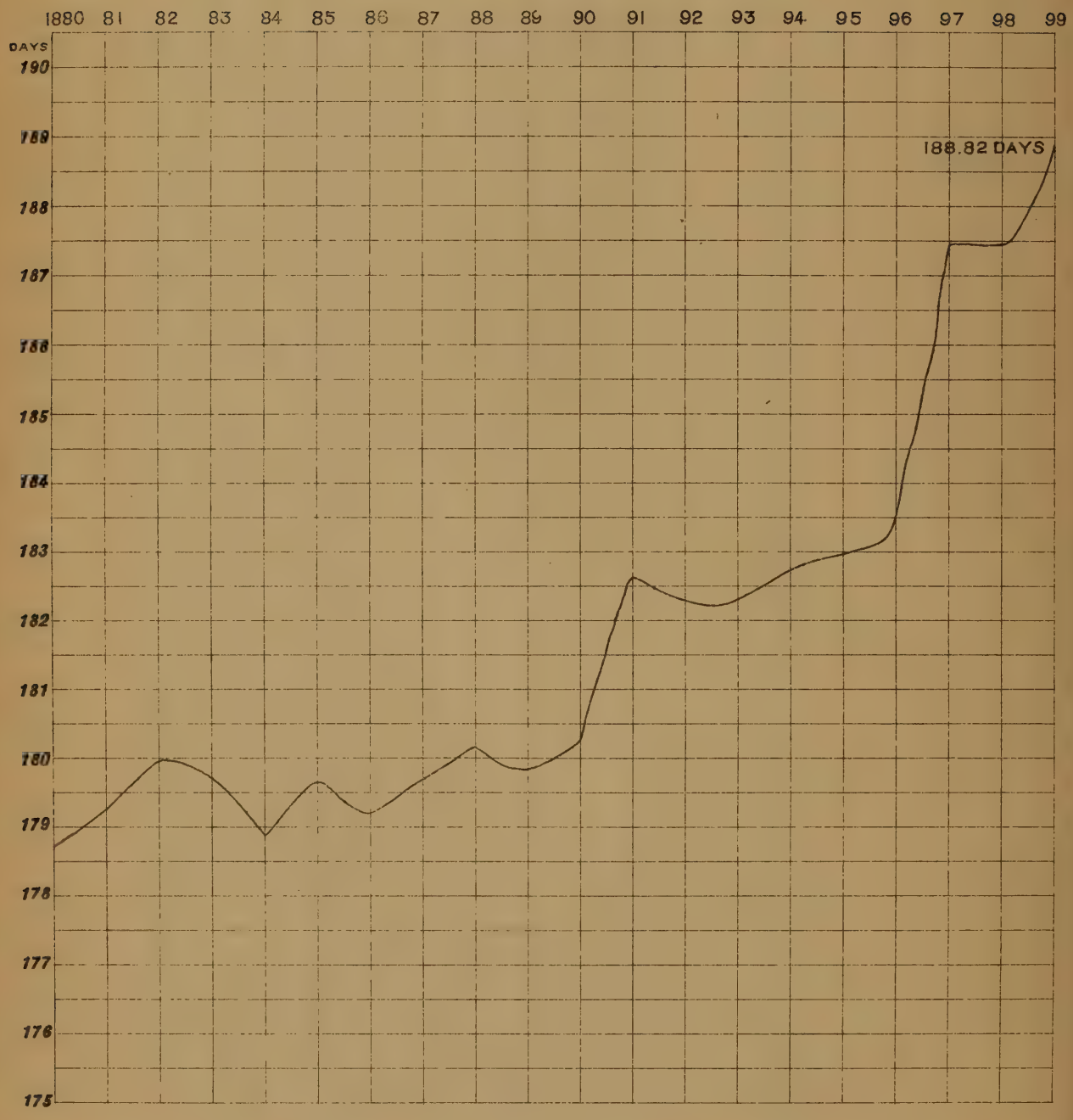

TABLE II

SCHOOL YEAR IN DAYS

Report of	Average Length
1880	178.60
1881	179.02
1882	179.98
1883	179.66
1884	178.77
1885	179.55
1886	179.18
1887	179.74
1888	180.18
1889	179.08
1890	180.32
1891	182.51
1892	182.26
1893	182.30
1894	182.74
1895	182.92
1896	183.32
1897	187.47
1898	187.45
1899	188.82

NUMBER OF CHILDREN

1. Enumerated. 2 Registered. 3 Average Attendance

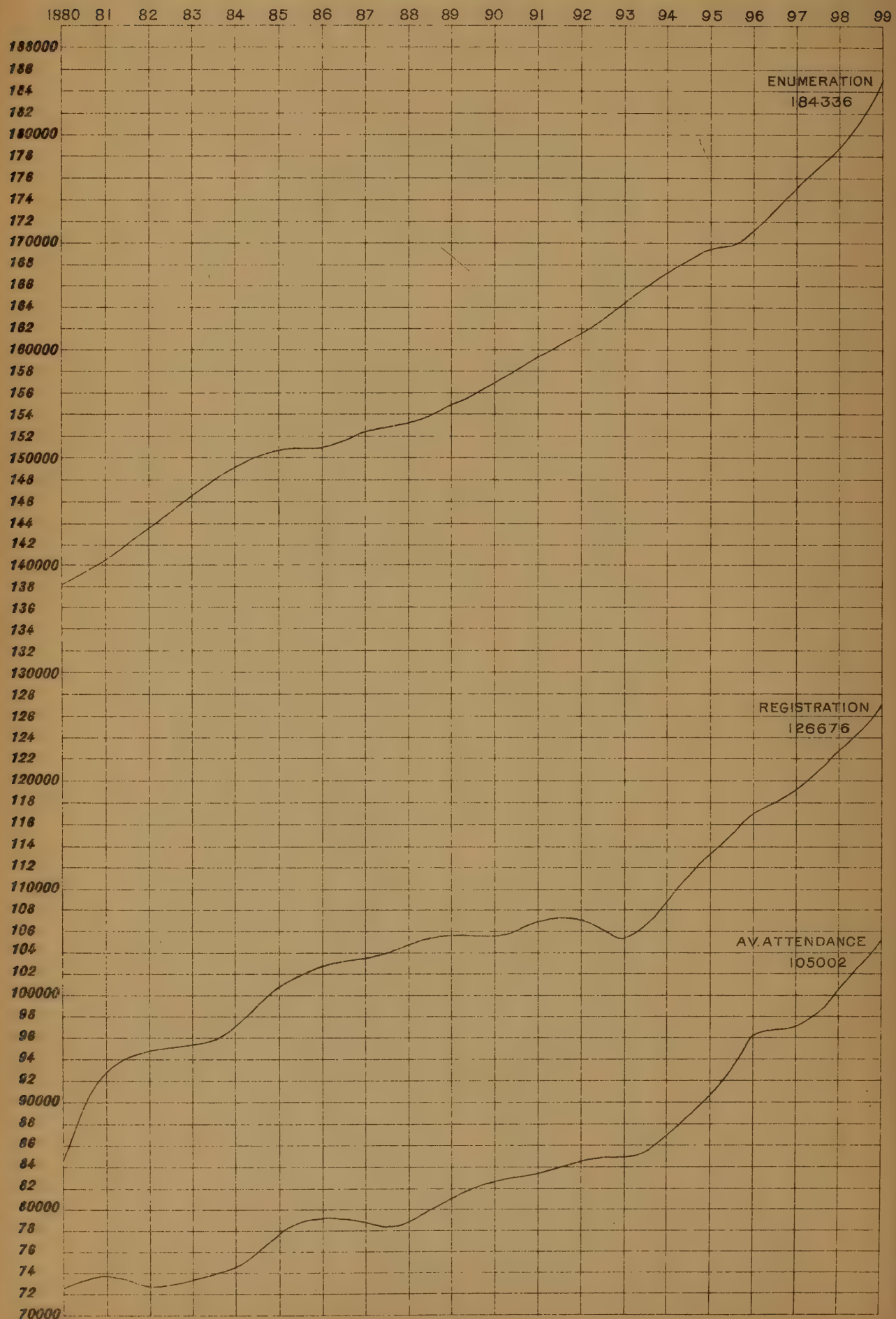

TABLE III

CHILDREN

1. Enumerated
2. Registered
3. In Average Attendance

Report of	Enumeration	Registration	Attendance
1880 . . .	138,428	85,761	72,642
1881 . . .	140,235	95,605	73,546
1882 . . .	143,745	96,178	72,539
1883 . . .	146,188	97,117	73,338
1884 . . .	149,466	98,168	74,875
1885 . . .	150,601	100,710	77,431
1886 . . .	151,069	102,895	79,052
1887 . . .	152,166	103,189	78,634
1888 . . .	153,260	104,239	78,981
1889 . . .	154,932	105,719	81,098
1890 . . .	157,243	105,563	82,382
1891 . . .	159,241	106,589	83,656
1892 . . .	161,241	106,906	84,304
1893 . . .	164,053	105,937	84,887
1894 . . .	167,809	109,191	86,255
1895 . . .	169,457	113,144	91,486
1896 . . .	170,589	117,490	96,213
1897 . . .	174,529	119,753	96,925
1898 . . .	179,263	123,064	101,018
1899 . . .	184,336	126,676	105,002

Men and Women Teachers in Public Schools

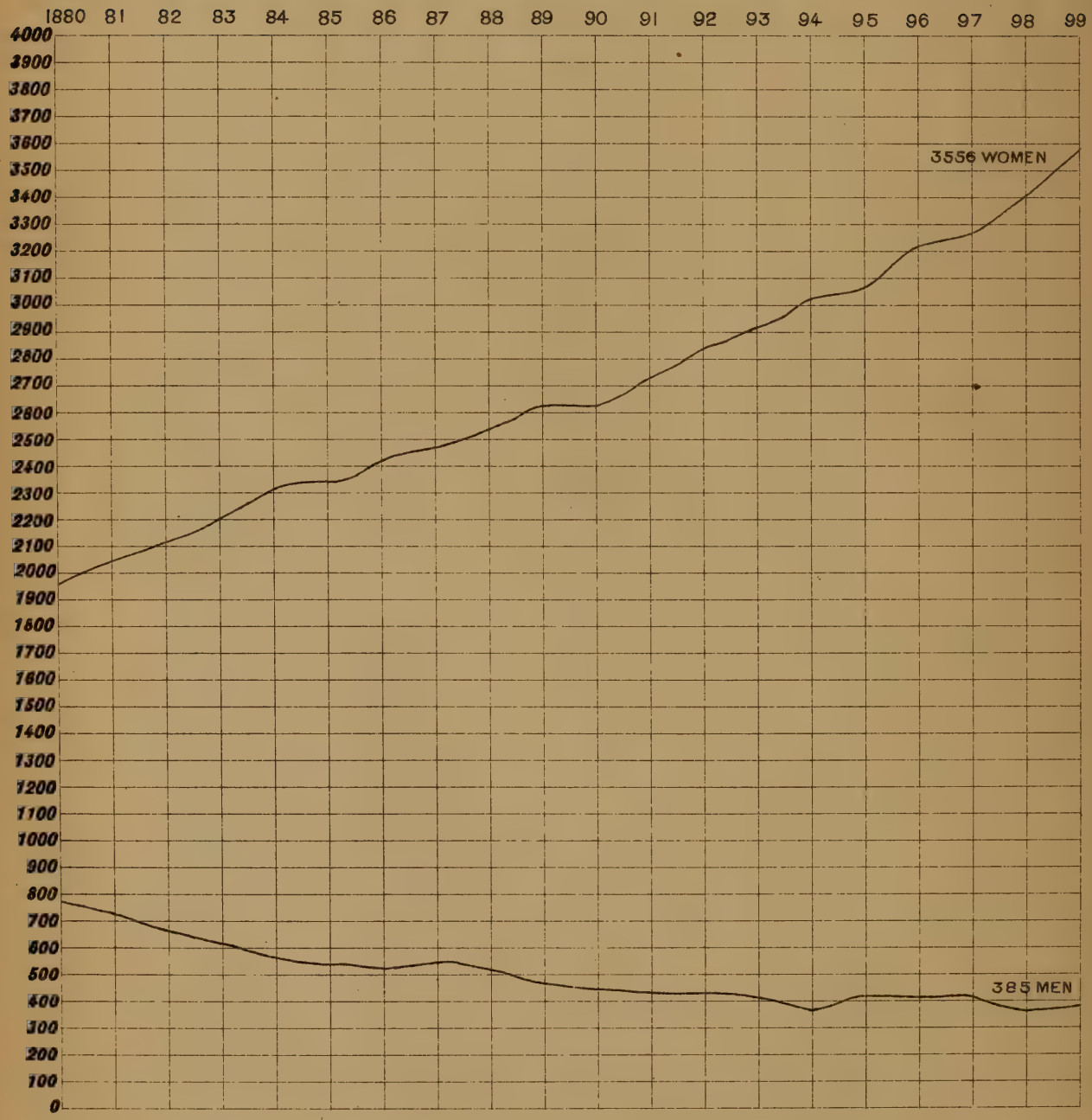

TABLE IV

TEACHERS

Report of	Men	Women
1880 . . .	773	1,968
1881 . . .	746	2,025
1882 . . .	680	2,120
1883 . . .	617	2,213
1884 . . .	566	2,301
1885 . . .	562	2,347
1886 . . .	546	2,442
1887 . . .	561	2,477
1888 . . .	533	2,559
1889 . . .	493	2,629
1890 . . .	468	2,631
1891 . . .	460	2,766
1892 . . .	434	2,866
1893 . . .	419	2,925
1894 . . .	390	3,025
1895 . . .	405	3,093
1896 . . .	403	3,228
1897 . . .	409	3,299
1898 . . .	382	3,409
1899 . . .	385	3,556

DIAGRAM V

INCOME

1 Permanent Investments. 2 Taxation. 3 Gifts. 4 Other Sources

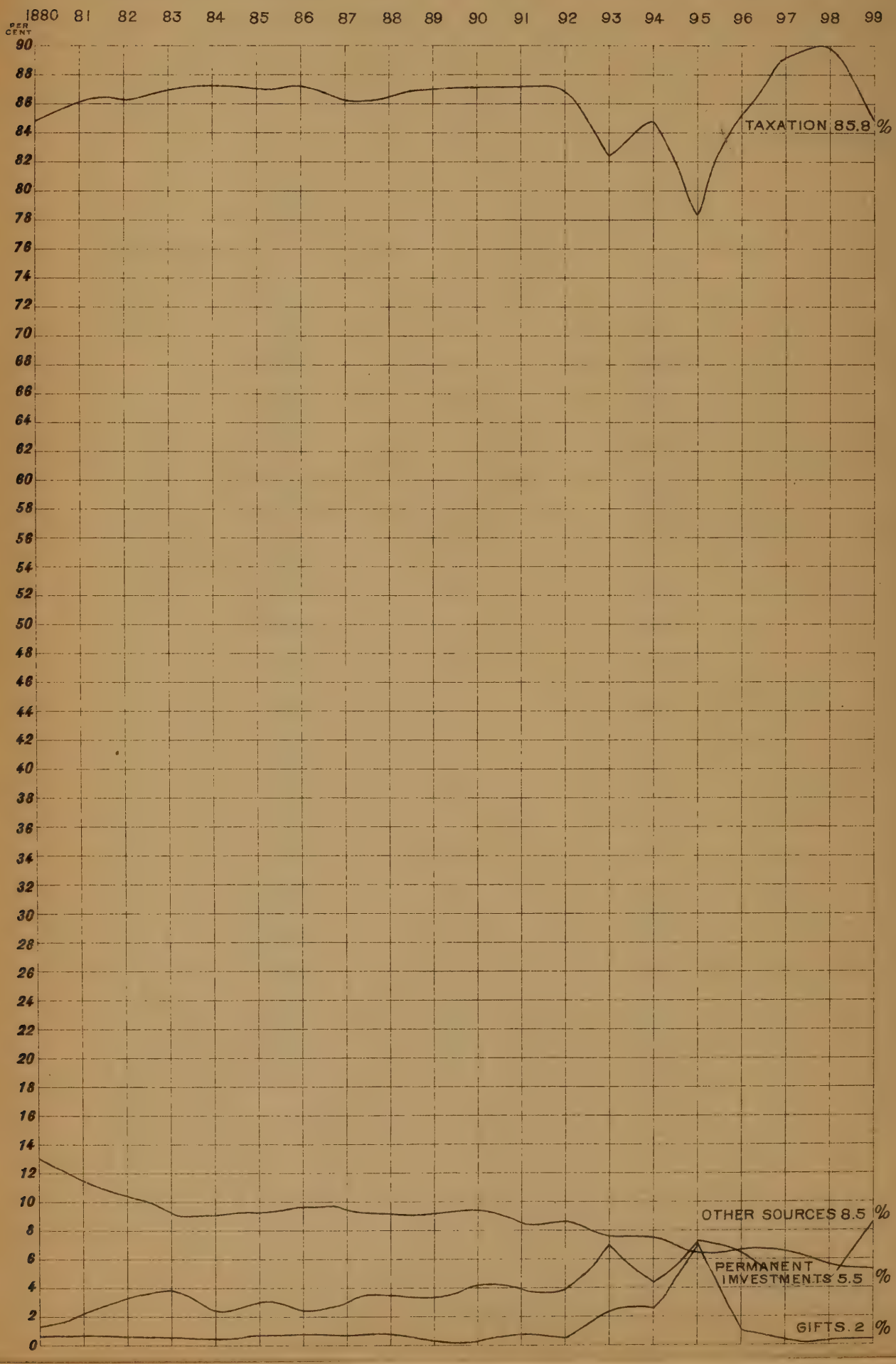

TABLE V

RECEIPTS

Report of	Permanent Investments	Taxation	Gifts	Other Sources
1880	12.9	85.0	.4	1.7
1881	11.3	86.1	.4	2.2
1882	10.2	86.2	.4	3.2
1883	9.0	87.1	.3	3.6
1884	9.5	87.4	.2	2.9
1885	9.4	87.4	.2	3.0
1886	9.8	87.4	.3	2.5
1887	9.7	86.2	.3	3.8
1888	9.0	86.7	.4	3.9
1889	9.2	87.3	.2	3.3
1890	8.1	87.7	.2	4.0
1891	8.1	87.7	.3	3.9
1892	8.2	87.9	.4	3.5
1893	7.3	82.9	2.4	7.4
1894	7.9	85.2	2.9	4.0
1895	6.7	78.4	7.9	7.0
1896	6.9	85.6	.8	6.7
1897	6.8	89.1	.2	3.9
1898	5.6	90.0	.2	4.2
1899	5.5	85.8	.2	8.5

EXPENDITURE

1 Maintenance. 2 Permanent Improvements. 3 Administration 4 Other Objects.

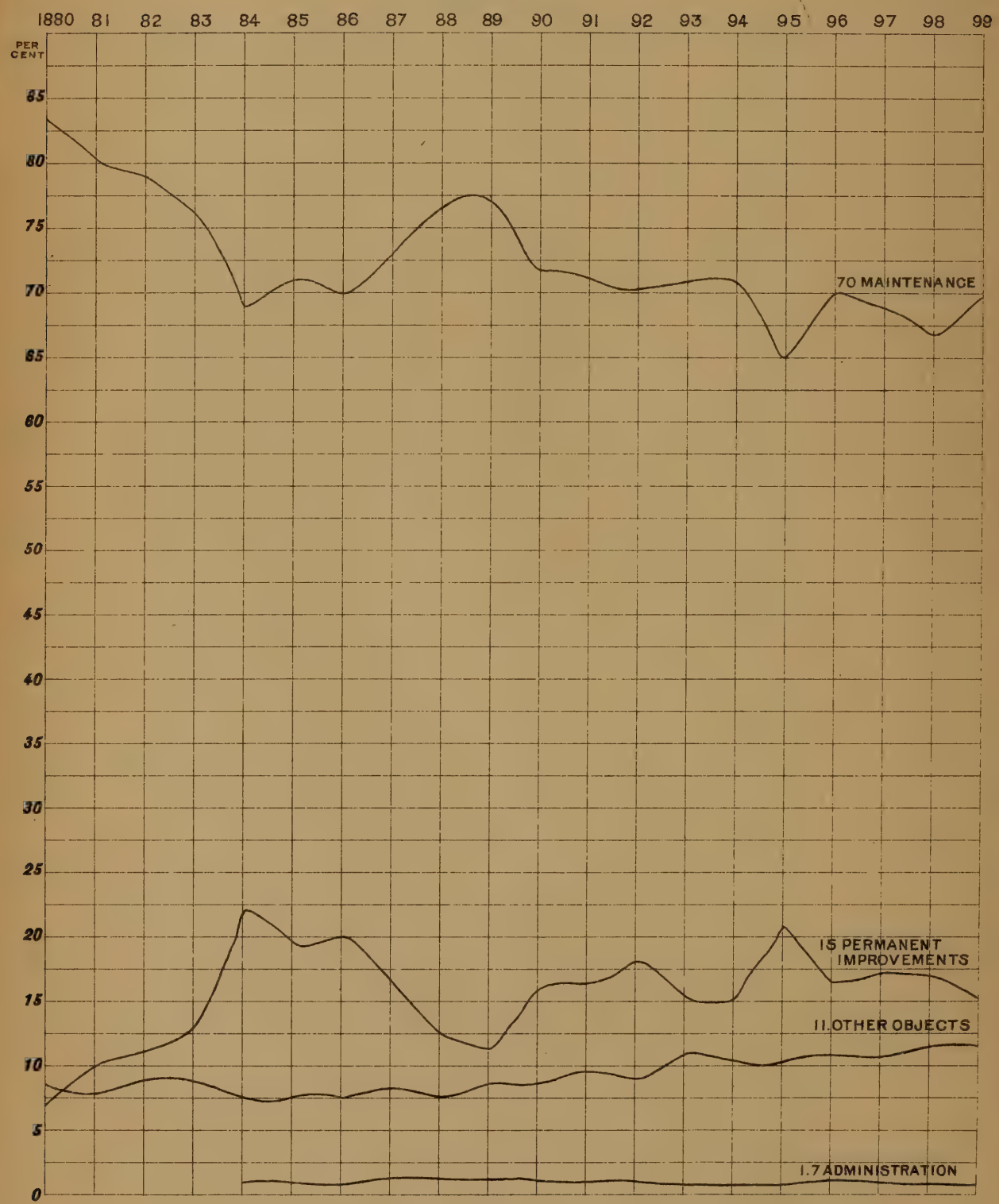

TABLE VI

EXPENSES

Report of	Maintenance	Permanent Improvements	Libraries and Apparatus	Administration	Other Objects
1880 . . .	83.0	7.8	.5	. .	8.7
1881 . . .	80.1	10.4	.7	. .	8.8
1882 . . .	78.0	11.9	.6	. .	9.5
1883 . . .	76.7	13.9	.8	. .	8.6
1884 . . .	68.3	22.6	.8	1.2	7.1
1885 . . .	71.5	19.1	.8	1.5	7.1
1886 . . .	70.2	20.4	.6	1.5	7.3
1887 . . .	73.4	16.3	.6	1.7	8.0
1888 . . .	77.8	12.5	.7	1.7	7.3
1889 . . .	77.8	11.6	.6	1.7	8.3
1890 . . .	72.5	16.6	.7	1.7	8.5
1891 . . .	71.1	16.9	.8	1.6	9.6
1892 . . .	70.4	18.7	.7	1.5	8.7
1893 . . .	71.6	15.0	.7	1.5	11.2
1894 . . .	71.9	15.2	.6	1.5	10.8
1895 . . .	65.7	21.6	.7	1.5	10.5
1896 . . .	70.4	16.2	.8	1.7	10.9
1897 . . .	69.0	17.7	.8	1.7	10.8
1898 . . .	68.0	17.9	.8	1.7	11.6
1899 . . .	70.6	15.7	.8	1.7	11.2

AVERAGE COST PER SCHOLAR.

1. Registered in Public Schools. 2. In average attendence in Public Schools

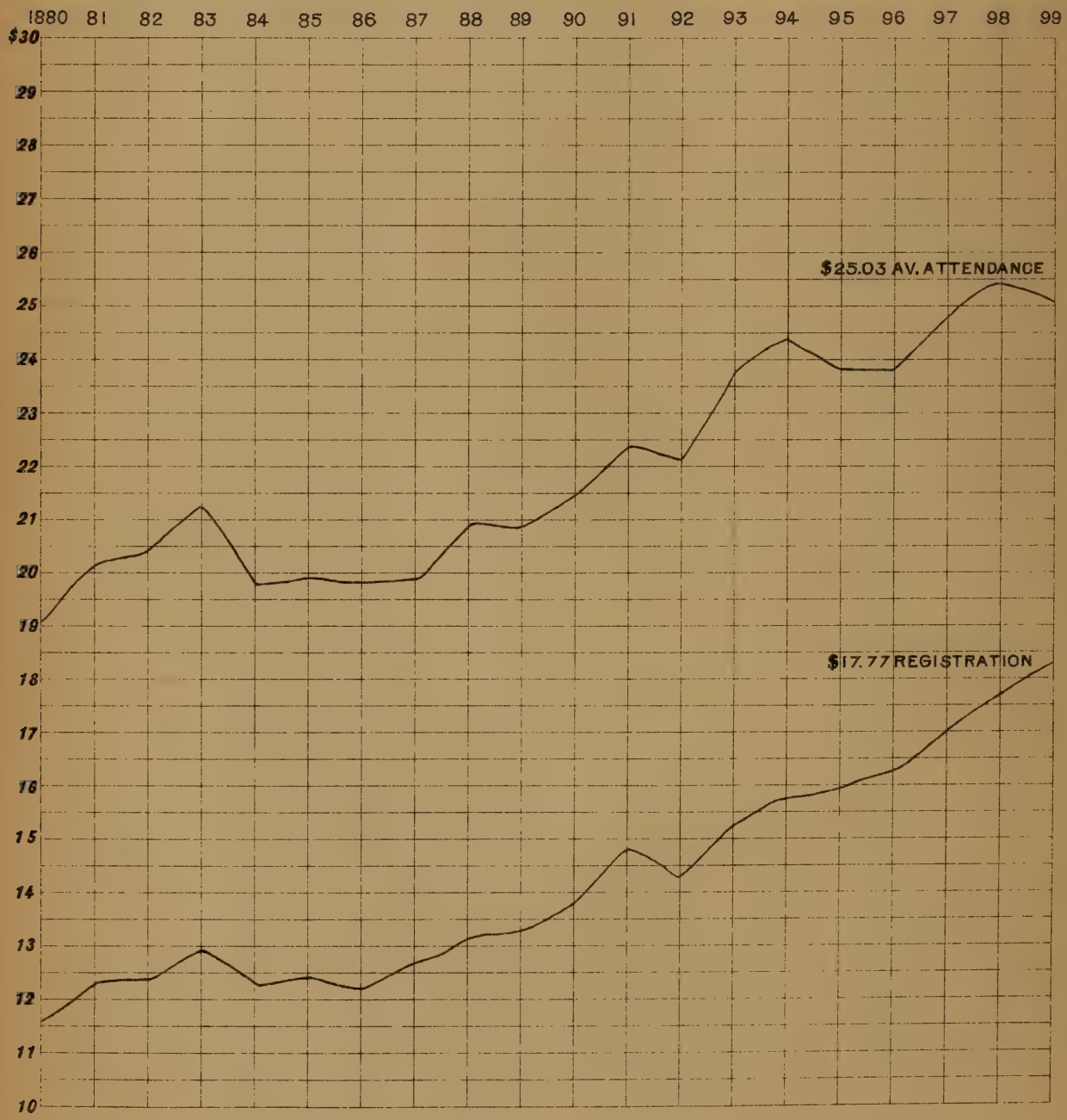

TABLE VII

AVERAGE COST PER SCHOLAR

1. Registered
2. In Average Attendance

Report of	Cost for each child Registered	Cost for each child in Attendance
1880 . . .	11.05	19.14
1881 . . .	12.37	20.14
1882 . . .	12.41	20.43
1883 . . .	12.90	21.46
1884 . . .	12.33	19.85
1885 . . .	12.47	19.86
1886 . . .	12.40	19.72
1887 . . .	12.54	19.73
1888 . . .	13.12	20.89
1889 . . .	13.40	20.82
1890 . . .	13.83	21.34
1891 . . .	14.72	22.26
1892 . . .	14.42	22.05
1893 . . .	15.40	23.77
1894 . . .	15.70	24.26
1895 . . .	16.01	23.81
1896 . . .	16.39	23.66
1897 . . .	17.06	24.90
1898 . . .	17.78	25.32
1899 . . .	17.77	25.03

Wages of Men & Women teachers in Public Schools

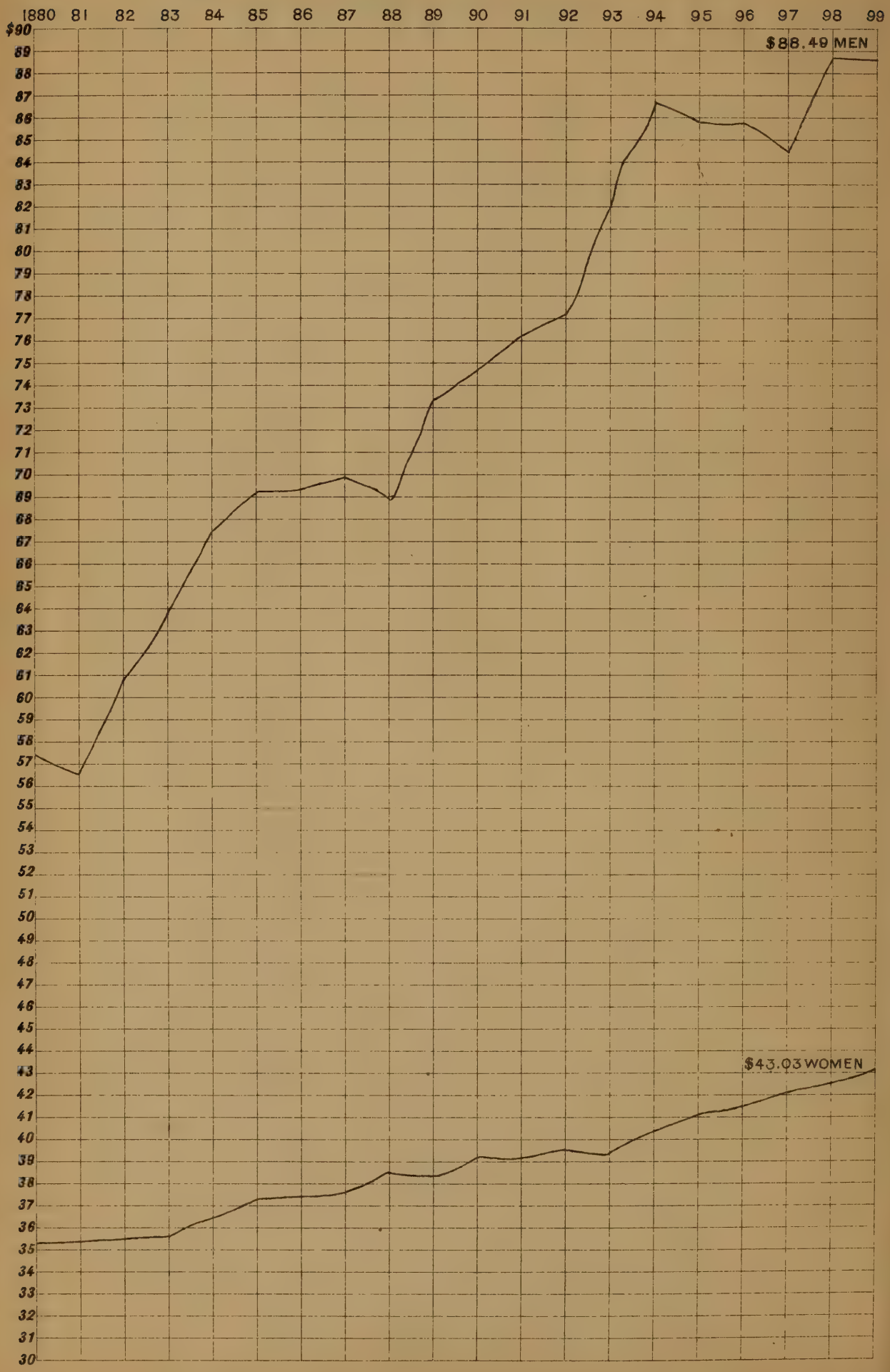

TABLE VIII

WAGES OF MEN AND WOMEN TEACHERS

Report of	Men	Women
1880 . . .	57.19	35.27
1881 . . .	56.43	35.42
1882 . . .	60.69	35.37
1883 . . .	63.44	35.94
1884 . . .	67.36	36.52
1885 . . .	69.17	37.21
1886 . . .	69.16	37.64
1887 . . .	69.89	37.97
1888 . . .	68.82	38.50
1889 . . .	73.50	38.52
1890 . . .	74.47	39.31
1891 . . .	76.24	39.34
1892 . . .	77.11	39.84
1893 . . .	83.69	39.48
1894 . . .	86.48	40.64
1895 . . .	85.87	41.48
1896 . . .	85.58	41.88
1897 . . .	84.65	42.34
1898 . . .	88.77	42.70
1899 . . .	88.49	43.03

In the following pages will be found the customary analysis of the educational work of the year. For convenience the same arrangement as in past years is retained.

General Statistics

The following statistics are of general interest:

Population of Connecticut, 1897 (estimated)	851,632
Number of children between 4 and 16 years of age	184,336
Number of pupils enrolled in the common schools	147,833
Increase	3,912
Percentage of increase	2.71
Enrolled per capita of population	17.35
Number of schools	1,547
Number of departments	3,628
Average daily attendance	105,002
Increase	3,938
Percentage of increase	3.8
Ratio to enrollment	71.02
Average number of days the schools were kept	188.82
Number of schoolhouses	1,617
Value of all public school property	$9,879,922.07
Value per capita of population	11.60
Value per capita of average attendance	94.05
Number of teachers	
Males, winter	385
Females, winter	3,556
Total	3,941
Males, summer	365
Females, summer	3,584
Total	3,949
Percentage of male teachers	9.5
Average monthly wages of teachers	
Males	$88.49
Decrease	.33
Females	43.03
Increase	.33
Revenue	
From permanent funds	$160,419.18
From state taxes	291,848.84
From local taxes	2,154,301.06
From other sources	242,403.24
Total	2,848,972.32

Percentage of revenue derived from permanent funds	5.63
State taxes	10.24
Local taxes	75.62
Other sources	8.51
Expenditure	
For new buildings	$357,834.27
For libraries and apparatus	24,984.11
For running expenses, including salaries of teachers and superintendents	$2,159,591.59
For other expenses	443,752.62
Total	$2,986,162.59
Expenditure per capita of population for running expenses	$2.53
Total expenditure	3.50
Daily cost of education per pupil	
For running expenses	10.8 cents
For all purposes	15.0 cents
Amount of permanent invested funds	$3,054,541.34

Financial Statement

Summary of Statistics, 1897-8

Dividend per child from School Fund	66.49 cents
Income of School Fund distributed	$122,427.91
Amount paid for schools from state tax	291,848.84
Income from Town Deposit Fund	30,685.21
Income from local funds	7,306.06
Amount raised for schools by town tax	1,384,614.12
Decrease for the year	89,952.07
Amount raised for schools by district tax	769,686.94
Increase for the year	68,052.86
Amount of voluntary contributions for schools	4,904.94
Amount for schools from other sources	237,498.30
Total amount received for public schools from all sources	2,848,972.32
Increase for the year	111,022.59
Amount expended for teachers' wages	1,850,210.72
Increase for the year	63,831.01
Amount expended for fuel and incidentals	257,558.52
Increase for the year	32,160.41
Amount expended for repairs of school buildings	109,564.51
Decrease for the year	20,886.52
Amount expended for libraries and apparatus	24,984.11
Increase for the year	128.32
Amount expended for new schoolhouses	357,834.27
Decrease for the year	42,677.57
Amount expended for other school purposes	385,910.46
Decrease for the year	6,218.53
Total amount expended for public schools	2,986,162.59
Increase for the year	26,337.12

Estimated value of school property in the state	9,879,922.07
School district indebtedness of the state	3,164,538.37
Cost of superintendence of schools	51,722.35
Cost of new schoolhouses completed during the year	298,925.61
Number of districts that raised a tax during the year	103

Receipts

The sum received by the 168 towns was $2,848,972.32, as compared with $2,737,949.73 in the year 1896-7.

The principal sources of income are permanent investments, taxation, and voluntary contributions.

Permanent investments include the school fund, town deposit fund, and local funds.

PERMANENT INVESTMENTS

School Fund. — On the 30th of September, 1898, the principal of the School Fund was invested as follows:

TABLE IX

Bonds and mortgages	$1,655,305.99
Real estate	197,419.38
Bank stock	123,012.61
Cash	38,942.69
Total	$2,014,680.67

Town Deposit Fund. — The amount deposited with the towns in 1837 was $763,661.83. The sum now returned is $754,972.34. The principal is often a debt of a town to itself, and the interest is raised by taxation. This interest reported in 1898 was $30,685.21.

In most towns this fund is not fruitful, and exists on paper only.

Local Funds. — The principal of local funds is returned as $282,451.03, and the income $7,306.06.

The principal of most of these funds was given before schools were maintained by taxation.

The amount of all permanent invested funds is $3,054,-541.34.

In the following table is given the income of permanent investments since 1866:

TABLE X

Year	School Fund	*Per cent.	Town Deposit Fund	Local Funds
1866	$136,471 94	19.3	$48,078.92	.....
1867	132,972.40	13.5	47,951.72	.....
1868	136,015.00	13.0	44,979.34	.....
1869	124,082.00	9.7	43,985.75	$8,919.15
1870	125,407.00	8.4	44,883.94	12,300.34
1871	128,468.00	8.4	45,650.19	7,920.77
1872	131,748.00	9.1	45,167.37	9,627.23
1873	132,848.00	8.5	45,715.80	11,348.05
1874	133,528.00	8.2	45,452.58	12,196.45
1875	148,220.60	8.6	46,003.03	16,064.71
1876	135,189.00	8.6	46,534.97	15,614.79
1877	137,261.00	9.1	47,665.00	12,562.54
1878	138,475.00	9.1	44,538.92	12,754.62
1879	124,585.20	8.9	44,983.66	10,967.86
1880	112,188.00	7.5	43,994.35	10,723.67
1881	100,611.70	6.7	43,713.44	11,141.74
1882	87,721.20	5.0	42,979.23	7,718.56
1883	112,096.50	7.1	43,937.52	8,582.13
1884	112,950.75	6.4	42,156.28	9,310.94
1885	120,855.20	6.9	42,089.06	8,553.16
1886	114,124.20	6.8	40,387.06	8,305.80
1887	114,945.00	6.4	39,350.07	8,455 48
1888	116,199.00	6.6	38,835.65	7,723.20
1889	117,932.25	5.9	37,044.67	7,968.50
1890	119,430.75	5.9	35,068.83	7,589.45
1891	120,930.75	6.0	35,584.95	7,839.16
1892	123,039.75	5.4	35,255.93	8,344.70
1893	125,856.75	5.8	33,873.69	8,815.39
1894	127,092.75	5.0	33,702.01	9,280.49
1895	127,941.75	5.2	33,593.36	7,615.93
1896	130,832.25	5.2	33,288.80	7,639.22
1897	112,523.08	4.1	31,795.23	6,915.07
1898	122,427.91	4.3	31,908.41	7,020.46
1899	.....	....	30,685.21	7,306.06

*Per cent. which the income of school fund constitutes of the total receipts for schools.

Taxation

State Tax. — From the State Treasury there was paid to the towns $2.25 for each enumerated person. The amount paid was $291,848.84, as against $290,818.67 in 1896.

Town Tax. — One hundred and sixty-eight towns raised $1,384,614.12 for school purposes, as compared with $1,474,566.19 in 1896-7.

District Tax. — There are 1,127 districts in the state, including the city districts of Waterbury, Middletown, and New Haven. One hundred and three districts raised $769,686.94.

Since 1866 the amounts received from taxation, together

with the per cent. which each constitutes of the total receipts for school purposes, are exhibited in the following table:

TABLE XI

Year	District Tax	Per cent.	Town Tax	Per cent.	State Tax	Per Cent
1866	$317,937.37	45.0	$93,726.10	13.2	.....	...
1867	466,931.90	47.4	149,680.99	15.2	.....	....
1868	467,804.77	44.8	160,347.35	15.3	.....	....
1869	491,420.61	38.7	415,318.26	32.7	.....	....
1870	498,846.09	33.6	568,387.50	38.3	.....	....
1871	410,708.11	27.2	641,837.76	42.6	.....	....
1872	485,523.56	33.5	642,194.11	44.5	$65,874.00	4.5
1873	499,555.19	32.3	598,873.44	38.8	199,272.00	12.0
1874	502,500.80	31.1	669,856.88	41.5	200,292.00	12.3
1875	463,775.19	22.7	668,167.13	41.9	202,119.00	12.6
1876	399,834.65	25.6	711,167.98	45.5	202,783.50	12.9
1877	349,949.89	23.2	697,103.26	46.2	205,891.50	13.6
1878	362,128.54	23.9	682,407.59	45.2	207,712.50	13.7
1879	341,018.81	24.4	635,328.58	45.6	207,642.00	14.9
1880	416,306.33	28.0	649,987.83	43.8	210,352.50	14.1
1881	393,007.82	26.5	670,146.35	45.2	215,596.50	14.5
1882	382,515.80	24.4	760,105.40	48.6	219,303.00	14.0
1883	452,616.96	26.1	840,365.39	48.4	224,193.00	12.9
1884	484,343.55	27.8	810,253.93	46.6	225,901.50	13.0
1885	525,119.36	30.2	764,688 09	44.0	226,603.50	13.0
1886	448,005.33	26.9	758,797.83	45.6	228,249.00	13.7
1887	499,804.42	27.8	825,554.24	46.0	229,890.00	12.8
1888	453,483.69	25.9	844,901.14	48.2	232,398.00	13.2
1889	570,660 69	28.6	941,881.01	47.3	235,864 50	11.8
1890	580,010.79	28.7	953,890.88	47.3	238,861.50	11.7
1891	550,898.68	27.4	976,211.51	48.5	241,861.50	12.0
1892	581,012.59	25.6	1,054,372.46	46.5	246,079.50	10.8
1893	535,017.01	24.9	1,042,769.62	48.5	251,713.50	11.7
1894	568,983.23	22.6	1,144,666.09	45.6	254,185.50	10.1
1895	655,177.02	26.6	1,195,138.88	48.6	255,883.50	10.4
1896	708,509.63	28.3	1,259,660.70	50.3	261,664.50	10.4
1897	701,634.08	25.6	1,474,566.19	53.8	290,818.67	10.6
1898	769,686.94	27.0	1,384,614.12	48.6	291,848.84	10.2

VOLUNTARY CONTRIBUTIONS

The following table shows annual gifts since 1875:

TABLE XII

Report for Year		Report for Year		Per cent. of total Receipts
1875	$6,637.89	1887	$4,348.05	....
1876	6,881.26	1888	6,844.44	....
1877	4,599.11	1889	4,138.89	....
1878	4,755.00	1890	4,503.88	....
1879	5,956.87	1891	5,513.57	....
1880	4,616.78	1892	7,641.57	....
1881	5,870.33	1893	54,154.10	2.38
1882	5,050.05	1894	61,753.70	2.87
1883	5,025.53	1895	199,587.57	7.95
1884	3,758.10	1896	19,866.04	0.80
1885	4,329.01	1897	4,881.76	0.19
1886	5,865.46	1898	4,966.65	0.18
		1899	4,904.94	0.17
Total			$446,450.55	

MISCELLANEOUS

From miscellaneous sources, including tuition fees, were received $237,498.30.

The amounts grouped under this head since 1890 are as follows:

TABLE XIII

Report for Year		Report for Year	
1890	$76,836.27	1895	$174,004.48
1891	74,535.51	1896	163,339.08
1892	68,238.94	1897	96,881.38
1893	164,834.71	1898	114,512.19
1894	86,133.91	1899	237,498.30

SUMMARY

The following is a summary of receipts under the several heads, with the ratio which each bears to the total sum raised for school purposes:

TABLE XIV

		Per cent. of sum raised
From Permanent Investments		
School Fund	$122,427.91	4.3
Town Deposit Fund	30,685.21	1.0
Local Funds	7,306.06	.2
From Taxation		
Town Tax	1,384,614.12	48.6
District Tax	769,686.94	27.0
State Tax	291,848.84	10.2
From Voluntary Contributions	4,904.94	.2
From other sources, tuition, etc.	237,498.30	8.5

EXPENDITURES

The sum expended by school officers in the year under review was $2,986,162.59, as compared with $2,959,825.47 in the previous year.

School expenses are classed as follows:

1 Administration
2 Running Expenses or Maintenance
3 Permanent Improvements, Sites, Building Repairs
4 Payments on Indebtedness
5 Interest
6 Libraries and Apparatus

ADMINISTRATION

The amount expended under this head was $51,722.35. This represents the cost of superintendence and such other official activities as are authorized or enjoined by law.

TABLE XV

Report of	Per cent. of total cost of schools		Report of	Per cent. of total cost of schools	
1891	1.6	$33,174.58	1895	1.5	$39,215.29
1892	1.5	32,386.91	1896	1.7	44,950.59
1893	1.5	34,716.32	1897	1.7	46,814.91
1894	1.5	35,283.92	1898	1.7	51,138.74
			1899	1.7	51,722.35

The names and addresses of visitors will be found in the Appendix.

A list of superintendents and supervising principals is given on page 71.

RUNNING EXPENSES

Running expenses comprise teachers' wages, fuel, and incidentals.

The amount expended for these purposes is $2,159,591.59, which is 70.5 per cent. of the whole expense for schools.

The average daily cost of schooling a child, excluding all outlay except that specifically classed under this head, is 10.8 cents.

PERMANENT IMPROVEMENTS

Sites, new schoolhouses, and repairs are classed under this head.

For these purposes was paid $467,398.78, made up of $357,834.27 for new schoolhouses and sites, and $109,564.51 for repairs.

New buildings constituted 11.9 per cent. and repairs 3.6 per cent. of the whole expenditure for schools.

The number of new buildings and the annual expenditure since 1891 is as follows:

TABLE XVI*

Report of	No. Buildings	Cost
1891	10	$261,423.06
1892	20	307,830.92
1893	6	216,580.96
1894	12	248,232.19
1895	20	464,107.01
1896	12	308,058.21
1897	12	200,871.11
1898	17	400,511.84
1899	19	357,834.27
Totals	128	$2,765,449.57

LIBRARIES AND APPARATUS

This item rises steadily, as table xvii shows, and includes the State grant of $6,305. The number of libraries to which this money goes is rapidly increasing.

TABLE XVII

	No. Libraries		No. Libraries	
1891	364	$16,443.14	1895	484	$18,824.55
1892	383	15,121.33	1896	564	20,402.28
1893	398	15,426.86	1897	663	22,342.82
1894	461	15,180.65	1898	688	24,855.79
			1899	743	24,984.11

PAYMENTS ON INDEBTEDNESS

The reports show that $479,090.33 has been used to cancel indebtedness. The amount thus applied cannot be precisely reported, because in many instances town indebtedness is not separated from school indebtedness.

INTEREST

There was paid in the year 1897-8 about $125,000.00 for interest charges.

The ratio which each of these several items of expenditure bears to the total expenditure is exhibited in the following table:

TABLE XVIII

Administration	1.7
Running expenses—	
Teachers' wages, etc.	70.6
Permanent improvements	15.7
Library and apparatus	.8
Other objects	7.0
Interest	4.2

* This table gives the expenditure or outlay in school year 1897–8, and not the actual cost of the building when completed.

SUMMARY

A summary of expenditures is as follows:

TABLE XIX

Administration		$51,722.35
Running expenses—		
Teachers' wages	$1,850,210.72	
Fuel and incidentals	257,658.52	2,107,869.24
Permanent improvements—		
Sites and buildings	357,834.27	
Repairs	109,564.51	467,398.78
Library and apparatus		24,984.11
Payments on indebtedness		*479,090.33
Interest		†125,000.00
Other objects		209,188.11
Total		$2,986,162.59

The following table gives expenditures under the various heads for the years since 1866, and the per cent. each constitutes of the total expenditure for schools:

TABLE XX

Report of Year	Teachers' Wages	Per Cent.	Fuel and Incidentals	Per Cent.	New Buildings	Per Cent.	Repairs	Per Cent	Other Objects	Per Cent.
1866	$421,137.92	70.4	$84,464.90	14.1	$62,353.50	10.4	$29,515.87	4.9	.....	...
1867	482,677.50	67.3	63,421.32	8.8	73,212.35	10.2	38,789.62	5.4	$56,522.29	7.8
1868	557,193.22	57.8	64,606.19	6.7	196,453.28	20.4	49,471.84	5.1	92,200.75	9.5
1869	609,658.05	55.3	62,183.96	5.6	276,901.14	25.1	51,781.32	4.6	97,746.85	8.8
1870	695,539.25	54.3	77,090.60	6.0	305,631.72	23.8	63,555.81	4.9	131,782.99	10.3
1871	785,680.04	48.4	101,086.94	6.2	494,604.41	30.5	55,713.69	3.4	176,247.48	10.8
1872	833,759.96	55.6	98,238.44	6.5	370,369.73	24.7	70,005.64	4.6	117,148.21	7.8
1873	888,871.89	58.1	110,202.90	7.2	319,025.55	20.8	65,224.56	4.2	137,169.37	8.9
1874	959,229.40	64.9	128,588.05	8.7	226,705.78	15.3	53,960.87	3.6	100,862.89	6.8
1875	1,021,714.07	60.1	127,055.01	7.4	294,228.11	17.3	93,863.83	5.5	153,044.13	9.0
1876	1,057,242.19	68.0	140,130.42	9.6	135,135.46	8.7	77,544.46	4.3	134,269.17	8.6
1877	1,085,290.05	70.9	133,343.89	8.7	95,758.63	6.2	68,860.09	4.5	138,480.14	9.0
1878	1,058,682.28	70.1	134,125.12	8.8	98,698.80	6.5	73,516.83	4.8	135,655.57	8.9
1879	1,041,040.43	69.1	112,237.12	7.4	124,944.06	8.2	67,715.24	4.4	152,897.07	10.1
1880	1,015,882.91	73.7	128,362.43	9.3	37,227.65	2.7	71,346.14	5.1	115,648.79	8.4
1881	1,011,729.94	71.8	118,036.64	8.3	87,047.08	6.1	60,814.27	4.3	121,300.31	8.6
1882	1,025,322.66	69.4	119,392.50	8.6	111,904.78	7.5	65,819.65	4.4	144,774.38	9.7
1883	1,056,268.25	68.0	136,058.20	8.7	146,586.39	9.4	71,288.91	4.5	130,310.84	8.3
1884	1,094,580.61	60.3	145,303.89	8.0	327,408.32	18.0	85,062.22	4.6	146,162.55	8.0
1885	1,130,863.35	63.6	140,757.88	7.9	238,963.98	13.4	102,137.66	5.7	150,881.45	8.4
1886	1,166,879.13	62.9	135,720.40	7.3	293,212.83	15.8	86,384.99	4.6	158,489.05	8.5
1887	1,188,056.04	66.3	127,644.60	7.1	216,401.15	12.0	77,338.42	4.3	171,164.26	9.5
1888	1,227,412.60	69.4	148,786.24	8.4	117,860.67	6.6	104,911.91	5.9	156,207.22	8.8
1889	1,264,061.02	69.6	149,322.73	8.2	124,598.70	6.8	88,068.47	4.8	176,438.40	9.7
1890	1,291,472.88	65.0	149,016.64	7.5	226,190.45	11.3	105,619.00	5.3	196,624.30	9.9
1891	1,330,087.56	62.6	182,465.33	8.5	261,423.06	12.3	98,971.33	4.6	234,449.04	11.0
1892	1,369,432.57	63.1	158,788.33	7.3	307,830.92	14.2	98,870.99	4.5	217,034.64	10.0
1893	1,426,711.16	63.8	176,372.64	7.8	216,580.96	9.6	121,870.90	5.4	277,581.51	12.4
1894	1,485,377.23	63.4	200,838.80	8.5	248,232.19	10.6	109,775.87	4.6	281,946.69	12.0
1895	1,548,148.67	58.5	191,586.83	7.2	464,107.01	17.5	110,417.82	4.1	309,542.82	11.7
1896	1,621,183.73	62.7	199,929.56	7.7	308,058.21	11.9	109,668.80	4.2	325,867.24	12.6
1897	1,701,659.99	60.8	230,927.19	8.2	383,014.82	13.6	111,334.30	3.9	347,552.17	12.4
1898	1,786,379.71	60.3	225,408.11	7.6	400,511.84	13.5	130,451.03	4.4	392,128.99	13.2
1899	1,850,210.72	61.9	259,658.52	8.6	357,834.27	11.9	109,564.51	3.6	385,910.46	12.9

Not included in $2,986,162.59.

†Estimated in part.

The following table gives the receipts and expenses for schools since 1866, with the average cost of schooling children:

TABLE XXI

Year	Receipts	Expenses	Cost for each child enumerated	Cost for each child registered	Cost for each child in attendance
1866	$704,986.70	$716,203.79	$5.94	.....	$13.79
1867	983,806.32	962,728.21	8.14	.....	17.98
1868	1,043,086.71	1,102,170.19	8.44	$10.49	18.08
1869	1,269,152.83	1,278,827.01	10.23	12.05	20.97
1870	1,484,016.35	1,621,387.76	11.83	13.41	23.69
1871	1,503,617.62	1,496,980.95	11.70	13.23	23.98
1872	1,442,669.01	1,528,440.07	10.95	12.56	22.95
1873	1,542,489.20	1,477,442.72	11.60	13.44	24 08
1874	1,612,947.64	1,697,573.97	12.08	13.52	23.98
1875	1,592,858.11	1,552,583.85	11.81	14.17	23.22
1876	1,560,565.06	1,529,181.52	11.54	13.10	22.13
1877	1,506,218.67	1,510,222.56	10.99	12.63	20.87
1878	1,509,158.85	1,506,477.06	10.90	12.59	20.52
1879	1,390,972.54	1,375,880.46	10.05	11.65	19.14
1880	1,481,680.93	1,408,374.74	10.57	12.37	20.14
1881	1,482,024.39	1,476,690.95	10.31	12.41	20.43
1882	1,563,750.30	1,553,065.16	10.69	12.90	21.46
1883	1,733,392.88	1,813,486.11	9.94	12.33	19.85
1884	1,737,923.36	1,777,277.04	10.21	12.47	19.86
1885	1,735,384.21	1,852,221.45	10.31	12.40	19.72
1886	1,663,019.17	1,791,666.21	10.35	12.54	19.73
1887	1,793,369.19	1,768,371.06	10.76	13.12	20.89
1888	1,749,708.04	1,813,823.04	10.90	13.40	20.82
1889	1,990,336.88	1,984,254.47	11.17	13.83	21.34
1890	2,015,667.11	2,123,839.46	11.69	14.72	22.26
1891	2,009,383.58	2,167,079.18	11.53	14.42	22.05
1892	2,266,182.19	2,234,544.03	12.30	15.40	23.77
1893	2,146,226.99	2,341,351.43	12.47	15.70	24.26
1894	2,509,728.91	2,642,627.70	12.85	16.01	23.81
1895	2,458,274.29	2,585,109.82	13.34	16.39	23.66
1896	2,501,140.52	2,796,831.29	13.83	17.06	24.90
1897	2,737,949.73	2,959,825.47	14.27	17.78	25.32
1898	2,848,972.32	2,986,162.59	14.25	17.77	25.03

INDEBTEDNESS

The towns and districts have availed themselves freely of the power of borrowing. To September 1, 1898, the indebtedness incurred was $3,164,538.37. This does not include considerable sums which are included in general town indebtedness.

The sums reported under this head since 1892 are as follows:

TABLE XXII

1892	$1,755,530.32	1895	$1,843,031.78
1893	1,873,645.86	1896	2,682,127.29
1894	1,887,227.73	1897	2,844,002.29
		1898	3,042,146.78
		1899	3.164,538.37

VALUE OF SCHOOL PROPERTY

The estimated value of school property is as follows:

TABLE XXIII

Report of Year	Estimated Value	Report of Year	Estimated Value
1892	$6,655,054.81	1896	$8,450,600.09
1893	7,237,001.12	1897	8,829,146.02
1894	7,508,536.49	1898	9,344,690.31
1895	8,042,411.12	1899	9,879,922.07

Enumeration, Registration, and Attendance

Summary of Statistics, 1897-8

Number of children between four and sixteen years of age October, 1897	184,336
Increase for the year	5,073
Number of scholars registered in winter	129,084
Increase for the year	3,323
Number of scholars registered in summer	124,269
Increase for the year	3,901
Number registered who were over 16 years of age	4,702
Decrease for the year	157
Number of different scholars in public schools	147,833
Increase for the year	3,912
Number of enumerated children in other schools than public schools	27,049
Increase for the year	241
Number of children between four and sixteen years of age in no school as shown by the returns of school visitors	25,183
Increase for the year	401
Number between four and sixteen years of age in no school as shown by enumeration returns of October, 1897	28,356
Decrease for the year	599
Average attendance in public schools in winter	106,945
Increase for the year	4,146
Average attendance in public schools in summer	103,059
Increase for the year	3,731
Percentage of the whole number registered in the year, as compared with the whole number enumerated in October, 1897	80.19
Percentage of children registered in schools of all kinds	94.87
Percentage of those enumerated registered in winter	70.02
Decrease for the year	.13
Percentage of those enumerated registered in summer	67.41
Increase for the year	.27
Percentage of average attendance in winter	82.84
Increase for the year	1.10

Percentage of average attendance in summer	82.93
Increase for the year	.41
Average attendance in winter as compared with number enumerated in October, 1897	58.01
Increase for the year	.67
Average attendance in summer as compared with number enumerated in October, 1897	55.90
Increase for the year	.50
Number of districts in which the average attendance for the year ending July 14, 1898, was eight or less	162

In the tables on pages 171-179 of the appendix will be found the enumeration, registration, and attendance by towns, and on pages 207-15 of the appendix the enumeration by districts in 1897.

ENUMERATION

The following table gives the October count of persons between 4 and 16 years of age for twelve years beginning with 1886, and the annual increase for the same years:

TABLE XXIV

Year	Enumeration	Increase
1886	153,260	1,094
1887	154,932	1,672
1888	157,243	2,311
1889	159,241	1,998
1890	161,241	2,000
1891	164,053	2,812
1892	167,809	3,756
1893	169,457	1,648
1894	170,589	1,132
1895	174,529	3,940
1896	179,263	4,734
1897	184,336	5,073
	Average annual increase	2,680

REGISTRATION

In eight years the enrollment in public schools has increased as follows:

TABLE XXV

Year	Increase	Year	Increase
1891	2,400	1895	2,833
1892	2,066	1896	2,603
1893	2,266	1897	2,436
1894	2,812	1898	3,912
		Total	21,328

ATTENDANCE

The average attendance has increased in eight years as follows:

TABLE XXVI

Year	Increase	Year	Increase
1891	647	1895	4,727
1892	583	1896	712
1893	1,368	1897	4,139
1894	5,231	1898	3,625
		Total	21,032

The following comparative table shows the annual increase in enumeration, enrollment, and attendance for the eight years beginning 1891:

TABLE XXVII

Year	Increase in Enumeration	Increase in Enrollment	Increase in Attendance
1891	2,000	2,400	647
1892	2,812	2,066	583
1893	3,756	2,266	1,368
1894	1,648	2,812	5,231
1895	1,132	2,833	4,727
1896	3,940	2,603	712
1897	4,734	2,436	4,139
1898	5,073	3,912	3,625
Total	25,095	21,328	21,032

The following table shows by counties increase of enumeration, registration, and attendance for 1897–8:

TABLE XXVIII

	Hartford			New Haven			New London			Fairfield		
	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance
Increase..	1,147	1,577	1,539	1,979	1,211	938	257	264	51	1,120	988	892
Decrease.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

	Windham			Litchfield			Middlesex			Tolland		
	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance	Enumeration	Registration	Attendance
Increase	.....	302	105	406	456	290	171	.....	29	56	126	94
Decrease	63	.....	.....	.....	.....	.....	.....	12	.....	.....	.....	.....

	State		
	Enumeration	Registration	Attendance
Increase	5,073	3,912	3,938
Decrease	.....	.....	.....
Total increase	5,073	3,912	3,938

The following table gives enumeration, registration, and attendance since 1866, with percentages:

TABLE XXIX

Report of the year	Average length of Schools in days	Enumerated	Registered		Different Scholars Registered	Per cent. Registered	No. in both Public and Private Schools	Per cent. in all Schools	Attendance		Per cent. of average Attendance
			Winter	Summer					Winter	Summer	
1866	.....	114,825	78,149	71,603	.....	.....	.....	.....	57,131	51,751	47.41
1867	.....	118,780	78,206	70,837	.....	.....	.....	.....	57,464	50,560	45.47
1868	.....	120,884	80,148	73,865	.....	.....	.....	.....	57,117	52,299	45.25
1869	163.05	123,650	82,140	75,177	99,390	80.38	.....	.....	59,489	53,645	45.74
1870	161.75	124,082	88,348	78,865	105,313	84.87	114,896	92.60	64,707	56,309	48.77
1871	168.51	125,409	94,092	83,192	110,640	88.19	119,944	95.64	66,902	58,348	49.13
1872	172.41	128,468	94,408	83,095	113,588	88.50	122,342	95.23	67,018	58,349	48.79
1873	173.34	131,748	94,787	83,874	114,805	87.14	123,834	93.99	67,599	58,113	47.70
1874	174.18	132,908	95,199	86,987	114,857	86.41	133,386	92.83	67,172	60,905	48.18
1875	176.29	133,528	99,550	89,674	119,298	89.34	127,720	95.65	71,433	63,052	50.35
1876	176.26	134,976	98,402	88,595	119,489	88.53	128,634	95.30	71,935	65,251	50.81
1877	178.13	135,189	98,923	89,832	119,106	88.10	128,922	95.36	74,369	66,621	52.14
1878	177.52	137,099	99,657	90,845	119,208	86.95	129,388	94.38	75,732	68,588	52.63
1879	178.47	138,407	100,288	91,433	119,828	86.56	130,937	94.60	77,218	69,912	53.15
1880	178.60	138,428	99,662	91,860	119,382	86.24	130,597	94.34	75,678	69,607	52.47
1881	179.02	140,235	100,596	90,614	119,694	85.35	132,337	94.37	78,421	68,672	52.44
1882	179.98	143,745	100,098	92,259	119,381	83.05	131,856	91.73	76,028	69,050	50.42
1883	179.66	146,188	101,759	92,475	121,185	82.90	134,084	91.72	77,041	69,636	50.16
1884	178.77	149,466	102,122	94,214	120,437	80.58	135,297	90.52	78,423	71,328	50.09
1885	179.55	150,601	103,921	97,499	123,280	81.85	137,860	91.53	80,075	74,787	48.80
1886	179.18	151,069	107,097	98,694	125,718	83.21	140,198	92.80	82,654	75,450	52.32
1887	179.74	152,166	107,213	99,166	125,539	82.50	140,714	92.47	82,949	76,719	52.46
1888	180.18	153,260	108,309	100,169	125,794	82.07	141,747	92.48	82,285	75,678	51.53
1889	179.08	154,932	109,550	101,889	126,055	81.36	143,234	92.44	83,856	78,341	52.34
1890	180.32	157,243	109,511	101,615	127,089	80.82	145,358	92.44	85,455	79,310	52.39
1891	182.51	159,241	110,476	102,703	126,505	79.44	145,571	91.41	86,275	81,038	52.53
1892	182.26	161,241	110,778	103,035	128,905	79.94	149,301	92.59	87,229	81,379	52.28
1893	182.30	164,053	109,214	102,661	130,971	79.83	152,448	92.92	87,527	82,247	51.74
1894	182.74	167,809	112,584	105,799	133,237	79.39	154,218	91.90	89,420	83,091	51.40
1895	182.92	169,457	116,116	110,172	136,048	80.28	157,509	92.94	93,607	89,366	53.98
1896	183.32	170,589	120,840	114,140	138,882	81.41	160,188	93.90	98,473	93,954	56.40
1897	187.47	174,529	122,304	117,203	141,485	81.06	165,315	94.72	99,976	93,874	55.53
1898	187.45	179,263	125,761	120,368	143,921	80.28	170,729	95.33	102,799	99,328	56.37
1899	188.82	184,336	129,084	124,269	147,833	80.19	174,882	94.87	106,945	103,059	56.96

Reports of Agents

Below will be found the special reports of the compelling agents. These reports contain much valuable matter.

Report of	Mr. Giles Potter	pages 38–42
	Mr. S. P. Willard	" 42–44
	Mr. W. S. Simmons	" 44–47
	Mr. M. A. Warren	" 47–53
	Mr. Frederick Doolittle	" 53–54
	Mr. John M. Wadhams	" 54–56

MR. GILES POTTER

To Mr. Charles D. Hine,

Secretary of the State Board of Education:—

Sir:—The plans pursued and results obtained in my efforts to secure proper observance of the laws of the state concerning the instruction and employment of children during the past year ending August 31, 1898, have been quite similar to those outlined in my reports of former years.

Statements of the law and letters addressed to parents have in some cases secured the ends desired in correcting irregularity in the attendance of the children at school. But I have found no other means so effective as visiting the schools, learning all the facts in each case of absence or irregularity, and personal interviews with parents. In this way excuses for allowing children to be absent from school can be answered at once, and sometimes parents are helped to overcome difficulties, real or imaginary, in sending their children to school regularly; and ways may be found for providing shoes or clothing for children who are destitute. Also, facts are ascertained that may be of special use, if prosecutions for violations of the law must follow. I have frequently had occasion to consult the family doctor, and in some cases, where the parents alleged physical disability of the children as the cause of their irregular attendance, I have employed a physician to examine the children, with results favorable to improvement in attendance at school.

In following table, showing work and results in towns visited, the number (884) of cases investigated does not include many interviews with teachers and children in school as to the causes of their irregular attendance, nor letters and statements of the law addressed to parents. The cases reported as investigated were chiefly those in which the investigation was made by interviews with parents and others having control of the children.

Most of the cases of disability were transient. Lack of clothing, especially of shoes, is a very common excuse for irregular attendance. Doubtless, this excuse is often given when parents, if more regardful of the welfare of their children, might without extra cost see that shoes are repaired or new ones provided in season.

The number given as lawfully at work includes children over fourteen years of age found in inspecting factories and stores, and children fourteen and fifteen years of age employed elsewhere as ascertained in visiting schools and families. Those unlawfully employed were in factories and stores, but the majority of them were not found in the inspections of those places of employment, but were reported by teachers as having left school, or were found on examining the school registers ; and on visiting their homes the fact of unlawful employment was ascertained.

As compared with the number of violations of law, the number of prosecutions is small. This is because other ways to secure observance of the law are tried before recourse to severe measures. If no prosecutions were made the law in many other cases would not be respected. In some cases, suspension of judgment has secured the desired results. Two cases against parents were lost on account of lack of proof of the ages of the children. Though I report fourteen children as found unlawfully employed one prosecution only was made. The children had obtained employment by falsely stating their ages or through the carelessness of overseers. None of these children were employed long, some of them but one day. In the case where a prosecution was made the employer sent for the child while attending school, knowing that she was under fourteen years of age, and when detected was trying to conceal the fact that she was employed.

The number of truants refers to those only who were found in the cases reported as investigated. Many others in the towns named were taken in charge by truant officers.

There is difficulty in enforcing the laws both in regard to attendance and employment as indicated above, on account of lack of proof of the ages of the children, especially if they are foreign born. Children whose ages appear on school registers as twelve years, a few months or a year later are said to be fourteen. If there were a law providing that the committee or persons who enumerate children in October shall take special care to ascertain from parents of foreign born children the dates of their births, and report them to the registrar of vital statistics for record, and that such records shall be the standard in determining the ages of these children, a part of the difficulty referred to might be removed. The school records now seem to be set aside when the parents testify under oath, though there may be good reasons for believing the ages as they appear on the school registers are correct.

During the year many cases of irregularity in attendance, as well as protracted absence from school, have been found, which would not have occurred, or could have been promptly corrected, if the law forbade the employment of children under fourteen years of age in any occupation while the schools are in session, or while parents are now required by law to cause them to attend

school. Boys are kept from school to work on farms, pick berries, drive horses, peddle papers, distribute advertisements, and on golf grounds; and girls as well as boys are employed in some of these occupations and in other ways. If the children were not so employed they would be in school, and there would be no occasion to prosecute the parents, our only remedy under our present laws.

TABLE XXX — SHOWING WORK AND RESULTS IN TOWNS VISITED DURING THE YEAR 1897-8

	TOWNS	Cases Investigated	Visits to Schools	Visits to Families	Visits to Factories and Stores	LAWFULLY ABSENT FROM SCHOOL			Unlawfully Absent from School.	Unlawfully employed	Sent to School	PROSECUTIONS		Truants	Sent to Conn. School for Boys	Sent to Industrial School for Girls	Sent to Temporary Homes
						Disability	Want of Cloth'g	At Work				Of Parents	Of Employers				
1	Ansonia	23	5	19	12	2	3	46	11	....	11	....	....	6	2	....	....
2	Bethel	....	....	....	11	....	....	4	...	....	....	...	....	....	....	....	....
3	Branford	...	....	....	2	....	....	9	....	....	....	....	....	....	....	....	....
4	Bridgeport	17	5	14	58	2	....	340	11	4	11	....	....	....	....	....	....
5	Brookfield	4	2	2	....	....	....	....	4	....	....	....	....	....	1	....	....
6	Canaan	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
7	Cheshire	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....
8	Danbury	2	1	....	9	....	....	23	....	....	....	....	....	1	....	....	....
9	Darien	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....
10	Derby	13	3	7	4	....	3	19	10	....	10	....	....	....	....	....	....
11	East Haven	13	3	5	....	1	3	2	9	....	9	1	....	....	....	....	....
12	Easton	11	7	6	....	1	....	....	9	....	9	....	....	....	....	....	....
13	Essex	3	3	1	4	....	....	7	1	1	1	....	....	....	..	....	....
14	Fairfield	55	12	35	...	1	....	6	44	....	44	3	....	2	2	....	....
15	Greenwich	13	2	9	2	2	2	12	9	....	9	....	....	....	....	....	....
16	Guilford	24	8	16	1	1	1	2	21	....	21	....	....	....	....	....	....
17	Haddam	3	12	...	....	....	....	....	1	....	1	....	....	....	....	....	....
18	Hamden	53	15	29	5	13	2	15	34	....	34	1	....	6	2	...	....
19	Hartford	1	1	....	24	....	....	154	....	....	....	....	....	....	....	....	....
20	Huntington	12	5	8	16	1	2	51	8	....	8	....	....	....	....	....	....
21	Killingworth	9	5	5	....	....	....	....	7	....	7	3	....	....	....	....	....
22	Madison	7	5	4	....	2	....	....	5	....	5	1	....	....	....	....	....
23	Meriden	29	5	19	19	4	2	46	19	1	19	2	....	....	....	....	....
24	Middletown	31	8	23	20	4	1	86	23	1	23	....	....	....	....	....	....
25	Milford	14	2	8	2	1	1	8	10	....	10	1	....	2	1	....	1
26	Monroe	9	2	...	....	....	....	....	....	....	....	....	....	....	....	....	....
27	Naugatuck	14	3	12	11	1	1	41	10	....	10	....	....	5	....	....	.
28	New Canaan	...	4	....	....	....	....	....	...	....	....	....	....	....	....	....	....
29	New Fairfield	2	1	2	....	....	....	....	2	....	2	....	....	....	....	....	....
30	New Haven	250	68	195	63	31	33	330	140	5	140	3	....	4	....	....	....
31	Newtown	17	10	7	3	....	3	1	11	....	11	....	....	1	....	....	....
32	No. Branford	17	4	10	....	2	....	1	14	....	14	3	....	....	....	....	....
33	North Canaan	....	2	....	....	....	....	...	....	....	....	....	....	....	....	....	....
34	North Haven	3	2	2	1	....	....	2	3	....	3	1	....	....	....	....	....
35	Norwalk	56	18	43	13	8	1	59	37	....	37	3	....	4	2	....	....
36	Orange	10	1	7	4	2	....	6	8	....	8	....	....	....	....	....	....
37	Ridgefield	7	4	1	....	....	1	1	4	....	4	....	....	....	....	....	....
38	Saybrook	1	1	1	...	....	....	...	1	....	....	....	....	....	....	....	....
39	Seymour	....	1	....	8	....	....	21	....	....	....	....	....	....	..	....	....
40	Stamford	72	13	48	3	6	9	20	45	....	45	2	....	8	2	.. .	4
41	Stratford	14	3	11	....	...	....	3	7	....	7	3	....	....	....	....	...
42	Trumbull	6	4	2	...	....	....	....	6	....	6	....	....	....	...	....	....
43	Wallingford	11	2	9	....	1	....	1	9	....	9	1	....	....	....	....	....
44	Waterbury	32	2	19	43	8	2	324	16	2	16	..	1	2	....	....	....
45	Westbrook	2	1	1	....	....	....	....	1	....	1	....	....	....	....	....	...
46	Weston	18	5	7	..	....	....	1	16	....	16	....	....	....	....	....	....
47	Westport	4	1	4	8	....	....	7	4	....	4	....	....	....	....	....	....
48	Wilton	2	2	....	..	....	....	....	2	....	....	....	....	....	....	....	....
	Totals	884	268	591	346	94	70	1648	572	14	565	28	1	41	12	....	5

The irregular attendance of children fourteen and fifteen years of age in some schools is very troublesome. We insist that the exception in the law allowing children of these ages to be exempt from its requirements, if lawfully employed to labor, does not mean that they may attend school irregularly, being absent one or more days each week when they can find a job or are wanted at home. But this exception is quite generally so construed, making the law seem to approve and even encourage irregular attendance. If the law can be so amended as to remove this ambiguity and to require that all children while enrolled as members of a school shall be regular in attendance, it might in some measure correct this evil.

The laws relative to the employment and education of children enacted in 1869 and 1872 were designed chiefly to secure the attendance at school, for one term at least each year, of children who were employed to labor the remaining part of the year, though the law of 1872 applied alike to all children under fourteen years of age. The objects of these laws were to afford every child some school instruction and to protect the commonwealth against the danger of the entire illiteracy of any part of its inhabitants. Now these laws as amended and extended are regarded as made for the protection of the schools and the regular attendants at the schools against evil effects of irregular attendants. For this reason, as well as for the good of the children and the welfare of the state, we must insist that the law which recognizes as an excuse for a child's absence from school nothing except sickness or mental incapacity of the child, shall be strictly observed.

Education and, as a means of education, school attendance are prime necessities, and should be so regarded in all domestic arrangements as well as in the legislation of the state.

When the question is asked how a family can get along without the services of a child who should be in school, the fact that the child must be in school should be regarded as settled, and the question should be, how can other arrangements be made in harmony with this fact. Doubtless, charitable associations and town agencies should do more in this line than they have done. The best way to prevent demand for "partial supplies" is to educate the children properly. The results, of course, will not appear in the present generation of adults, but will appear as the children grow up to manhood and womanhood.

A truant officer in one of our cities asked what should be done in a case where a child under thirteen years of age was living in a family and taking care of two younger children for her board and perhaps some other slight compensation. She was not attending school and if forced to attend must return to her parents where there was sickness and a home not suitable for her. I answered that persons who will take a child of her age for ser-

vice and will not send her to school are not suitable persons to have the control of the child, and that another home should be provided for her. To allow such a child to work in a family for her living at the expense of her education would be cause for reproach and shame to the good people of that city.

NEW HAVEN, September, 1898. GILES POTTER.

MR. CHARLES D. HINE,

Secretary State Board of Education.

SIR: — My work as agent for the past year has been (*a*) to enforce the attendance laws in the towns assigned to me, (*b*) to take charge of the state teachers' examinations, and to read most of the papers, (*c*) to perform such other duties in connection with the work of the board as have been assigned to me.

About forty towns were assigned to me for attendance work. From most of these towns monthly reports have been received, giving the attendance of each pupil over seven years of age. As far as possible, a thorough canvass was made in each of these towns. The enumeration list was checked with the registration, and all cases of non-attendance and of irregular attendance were investigated.

The result is given in table No. xxxi. Only the cases that were personally investigated are there reported.

When it was not possible to make an immediate visit and the report from a school showed a case of absence for a considerable time, and for an insufficient excuse, a notice was sent to the parent calling attention to the absence, and a copy of the law enclosed.

The reports from the teachers were carefully followed, and showed a better attendance, not only on the part of the cases investigated, but usually on the part of the rest of the school. But there is yet a great deal to be done before the attendance will be satisfactory. As long as human nature is as it is, so long it will be necessary to compel some people to live up to the requirements of laws made for their own good.

There are few cases of truancy, and these are found in the larger districts. The principal cause of irregular attendance the past year was found to be, aside from the recognized excuse of ill health, work at home. There are in every community parents who send their children to school regularly, if there is nothing that they can do at home to assist. But if there is work to be done about the place, tobacco to cut or strip, potatoes to plant or dig, produce to take to market, the boys are kept at home, perhaps one or two days each week, perhaps a week at a time. The girls are kept out to assist in the housework and to care for younger children.

In a few instances. the circumstances of the families are such that it seems almost a necessity for the children to assist, but in

TABLE XXXI

Towns	*Cases Investigated	Visits to			Lawfully Absent			Unlawfully		Sent to School	Moved Away	Found in some School	Outside of Age Limits
		Schools	Families	Factories	Disability	Lack of Clothing	Work	Absent	Employed				
Andover	7	1	1	...	....	....	....	1	....	1	....	4	....
Bolton	2	1	....	....	....	....	....	....	....	....	2	....	....
Bozrah	13	6	9	1	5	2	....	3	1	4	....	....	2
Chester	3	3	2	...	....	....	....	3	....	3	....	....	....
Colchester	36	5	19	....	5	2	....	28	....	28	1	....	....
Columbia	11	3	3	....	....	....	1	10	....	9	1	....	....
Coventry	20	6	9	6	....	....	1	13	....	10	3	6	....
Cromwell	58	11	33	1	3	4	10	38	....	38	....	7	....
East Haddam	11	3	4	5	1	....	4	5	....	5	....	....	1
East Hartford	3	1	2	....	....	....	....	3	....	3	....	....	....
East Windsor	39	10	24	2	3	....	....	35	1	36	....	....	....
Ellington	1	1	1	....	....	....	....	....	...	....	1	....	....
Enfield	16	5	8	4	....	....	1	18	1	16	....	3	....
Glastonbury	77	25	40	5	3	4	2	50	....	46	5	....	2
Hebron	25	8	13	1	1	....	4	19	....	17	3	....	....
Lebanon	53	18	15	1	1	..	5	41	....	25	....	20	....
Manchester	1	1	1	3	....	....	....	1	....	1	....	....	...
Mansfield	28	10	9	1	4	....	1	19	....	19	4	....	....
New Milford	20	11	8	....	....	....	....	17	....	17	4	....	....
Portland	35	19	29	2	2	2	1	15	....	16	5	4	1
Plymouth	3	2	3	....	....	....	....	1	....	1	....	2	....
Rocky Hill	24	6	13	....	....	...	....	17	....	17	....	7	....
Salem	17	6	5	....	1	3	....	12	....	12	....	1	....
Somers	11	5	8	1	....	....	1	10	....	10	....	....	....
South Windsor	1	....	1	...	....	....	1	....	....	....	....	....	....
Tolland	8	4	5	....	1	....	1	5	....	5	....	1	....
Union	24	7	10	....	....	....	....	17	....	7	4	13	....
Vernon	2	1	1	13	....	....	....	2	....	2	....	....	....
Wethersfield	3	2	2	....	....	....	....	3	....	3	....	....	....
Totals	552	181	278	46	30	17	33	386	3	351	33	68	6

* This number does not include cases where notice of irregularity and copies of laws were sent by mail.

the others it is the desire to get as much out of the children as possible, and save the expense of extra help. These children are taken out of school as soon as they reach the legal age for employment and are put in shop or store. They have, if they have attended all the time from eight to fourteen years of age, attended not more than one-half of the total number of days, and not more than one-fourth of the hours in these days. If, then, the child is absent two, or even one, day each week, the time of school attendance is reduced from twenty to forty per cent.

The same remarks will apply to other children who are out of school from neglect.

These are the families that require the attention of the agent, and only the knowledge that they are constantly watched and the fear of prosecution will make them send their children regularly to school.

During the year, examinations for state teachers' certificates were held at the office of the State Board of Education, at the Normal Schools, and during July and August in the following places: Falls Village, Norwich, New Milford, Ansonia, Putnam, Danbury, Meriden, Middletown, Waterbury, New London, Canaan, Old Saybrook, Lakeville, Winsted, Rockville, South Norwalk, Colchester, Stamford, Plainfield, Bridgeport, Thompsonville.

At these examinations, 413 different candidates took a whole or a part of the examinations, and 143 of these finished all the required work and received a certificate.

The number of papers read was over 2,500.

S. P. WILLARD.

Nov. 30, 1898.

MR. CHARLES D. HINE,

Secretary of the State Board of Education: —

Sir — The following is a report of my work as agent of the Board for the year ending August 31, 1898:

SCHOOL WORK

Number of towns visited			26
Number of schools visited			313
Number of families visited			191
Number of cases investigated			279
Number absent under legal excuses: —			
Mental or physical disability	21		
Lack of clothing	36		
At work	10		67
Number at work illegally (at home)			17
Number absent illegally			156
Number sent to school			177
Prosecutions of parents			10
Sent to Temporary Home			5

FACTORY WORK

Number of towns visited	16
Number of factories visited	84
Number of children illegally employed	1
Number of children discharged	1
Number of prosecutions of employers	0
Number between 14 and 16 years of age employed	802

IRREGULAR ATTENDANCE

The work which was taken up in 1895–6 and followed in 1896–7 of having teachers send in monthly reports of attendance of pupils, has been followed this year in twenty-nine towns of the district assigned me. The whole number of teachers reporting was three hundred and fifty-six. With but few exceptions, the teachers have taken up this work with commendable zeal, and their reports have given the agent a knowledge of the attendance with reasons or excuses for irregularity. Wishing to obtain from them their views regarding results to be obtained from the monthly report as shown in their own school, the following blank was sent out near the close of the school year :

Town, ... *Date*, ...
District, ... *Grade*, ...
No. scholars registered in fall term, ...
No. scholars registered in winter term, ...
No. scholars registered in spring term, ...

We shall be glad to obtain your opinion on the following points :

1. Have the monthly reports improved the attendance in your school?

.....

2. Do the parents understand these reports?

.....

3. Are they in sympathy with your endeavors?

.....

4. Do you have difficulty in ascertaining the cause of absences?

.....

5. Do the children understand that these reports are made?

.....

6. How many years have you taught in your present school?

.....

7. Remarks.

.....

.....

.....

.....

Teacher.

A blank was mailed to each teacher reporting, and of this number (three hundred and fifty-six) two hundred and ninety-eight were filled out and returned to me. Two hundred and forty-two teachers reporting in favor of monthly report; seventeen in doubt ; thirty-nine declaring it of no benefit. The general deduction being that, regularly followed, the reports were considered helpful.

Filling out the reports certainly adds to the work of the teacher;

but to the true teacher, the one whom we need in each schoolroom, the gain in regularity of attendance with the corresponding interest in studies to be naturally expected is a result worthy the additional hour's work. The teachers are asked to give the cause of absence under the following heads: sickness; want of clothing; working; neglect.

The number of cases reported and investigated as absent illegally was twenty-seven hundred and eleven, representing twenty-two hundred and five families. Each family was written to, and, in case of continued violation of the law, was visited. In a few cases prosecution was necessary to convince parents that the laws were to be enforced. In response to the twenty-two hundred and five letters of notification sent I received from at least one-fourth of this number of parents letters which, by requests for information, demanded a reply. Sometimes this could be met by a marked copy of the law; more often requiring a written answer. This shows something of the time necessarily consumed in office work, and adding to that the correspondence with town and school officers, teachers, parents, and persons unofficially interested in school work, it is seen that much time is spent in this way.

It is a fact to be regretted that so many of the men chosen by our towns to control school matters do not become thoroughly conversant with the laws which they are elected to enforce. It is not uncommon for the agent to receive a request from a school official, that some boy or girl under legal age may be allowed to leave school for this or that purpose, — the absence being clearly illegal; the idea seeming to obtain in the mind of the officer that the agent can set aside state law at will. The ignorance which permits such a request to be made is inexcusable in these days when copies of the law are to be found on every hand.

If school officials, who by their acceptance of these positions of authority indicate an interest in the work, show such a lamentable lack of knowledge, is it strange that indifferent parents resent the attempts made to secure for the children the advantages of a regular course of study?

It is this ignorance and consequent lack of interest which causes much of the irregular attendance.

Money is appropriated without stint; school buildings constructed on the best hygienic principles known to modern science; men and women of trained ability secured to teach; all the appliances for successful teaching provided; and the result? The state obliged to hire compelling agents to insist on the parents accepting for their children these advantages.

An examination of the registers in the three hundred and thirteen schools investigated during the year shows a perfect attendance at time of visit in only twenty-two rooms.

All conditions being equal at time of investigation, the con-

trast in attendance between the two eight-room graded schools given below suggests a chance for co-operative activity on the part of officials and parents in the second school.

The eighteenth school district of Stonington registered two hundred and ninety pupils, present two hundred and seventy-five; the second school mentioned registered three hundred and fifty-six pupils, present two hundred.

CHILD LABOR

During the past year there has been almost an entire conformity to the law regarding the employment of children in the manufacturing, mercantile, and mechanical establishments in my district. But one child under the legal age (14) was found employed without a certificate. That there are children not fourteen years old working in the mills no one who has seen them will question, but a certificate of age has been given by the parent stating that the child is over fourteen.

This condition will exist just as long as the state is obliged to furnish proof of age. As stated in a former report, these children are born in foreign countries and the parents understand the law well enough to know that a parent's certificate of age will necessarily be accepted, since the child's birthplace is known only to themselves.

W. S. Simmons.

Mr. Charles D. Hine,

Secretary of the State Board of Education.

Sir,— My work in enforcing attendance and inspecting factories during the year ending August 31, 1898, has been confined to the towns of Avon, Barkhamsted, Berlin, Bloomfield, Burlington, Canton, Colebrook, East Granby, Goshen, Granby, Hartland, New Britain, New Hartford, Newington, Simsbury, West Hartford, and Winchester. Of these seventeen towns, three — New Britain, West Hartford, and Simsbury, maintain a careful supervision of their schools; the others are under the district system. This fact divides my district into two distinct divisions: (1) Those towns which employ an agent to look after the details of school work, including attendance; and (2) those towns which do not. Concerning my work in the first-named division I beg leave briefly first to report.

TOWNS EMPLOYING A SUPERINTENDENT

These towns are New Britain, West Hartford, and Simsbury, as has been said. In my work in these towns it has been my aim to act as an assistant to the local authority; in no instance has the agent intruded between the superintendent and his teacher. All complaints as to non-attendance have gone first to the super-

intendent; only the more aggravated cases have been referred by him to me. Because of the activity of the superintendents, the general expectation to obey the law and the desire of the agent not to resort to drastic measures where milder means would avail, no prosecutions have been made during the year in these three towns. Indeed, the entire work in these towns has been light, as the appended figures will show.

Next after New Britain the town of Winchester is largest in population of any town within my district. This town contains the borough of Winsted, which, though almost a city in size, manages its schools according to the old district system. The principals of the two large graded schools, however, co-operated heartily with the agent and were as efficient in reporting cases for action as a superintendent could have been. What is wanted in Winchester is a superintendent who is paid enough to look after the simplest cases of non-attendance. Whether an agent of the State Board be justified in looking after details, the simplest of which would better be looked after by a local authority, is a question I submit to you for decision.

Within the past year four other towns within my district, Canton, New Hartford, Newington, and Goshen, have voted town management, and in the coming year will manage their schools townwise. Whether they will advance the coming year to supervision as well, cannot now be stated. Your attention is called to the ease with which adjoining towns, as, for instance, Canton and New Hartford, Newington and West Hartford, Goshen and Litchfield, Winchester and Norfolk, might unite to maintain skilled supervision.

TOWNS NOT EMPLOYING A SUPERINTENDENT

Of these towns there were fourteen within my district. All employ acting school visitors who visit the schools officially several times a year, who statedly and faithfully discharge any other duties devolving upon them by law, and who are paid a pittance for their services. With these officers it has been the first object of the agent to acquire and to continue a cordial understanding. A studious care has been taken to respect their prerogatives and to subtract in no respect from their authority. As a result, cordial co-operation without a single break has been maintained throughout the year.

From these fourteen towns reports have been made by teachers directly to the agent. Occasionally, acting school visitors have been called into council, but the burden of receiving and digesting reports, of investigating cases of absence, of explaining the law to delinquent parents, has never been put upon these gentlemen.

The course of procedure in these fourteen towns has been as follows: having secured the co-operation of the acting school

visitor, the October enumeration of all the children of all the districts in town has been obtained, and every child therein catalogued has been accounted for. Teachers have been asked to make monthly returns of the half days of attendance, absence, cause of absence, and age of each child; the parent's post-office address has also been reported. In special cases more frequent reports have been asked. In this way the school attendance of each child has been kept within review.

THE NEW PLAN

This plan of work is new. It did not originate with any agent of the State Board of Education, but with its secretary. It amounts to supervision so far as attendance goes. The old plan was to detect and prosecute here and there; it was the only plan which could at first be employed. The new plan is to cause teachers, pupils, and parents to feel that the eye of the state is upon them. Prosecutions will still be necessary, but not so frequently necessary.

No heralding of the fact of state oversight is attempted. The news quietly makes its way. The fact that he makes monthly reports of attendance to a state officer is not confined to the teacher's inner consciousness; parents hear and talk of it; pupils learn the secret; indeed, without doubt, the fact is used by many teachers as a lash. A feeling that our school, even ours, is being looked after usurps the place of the feeling of neglect. How to make the new plan effective is the problem set the agent.

Under the new plan much of the labor is desk work. The reports received must be carefully scanned; comparisons with the October enumerations to detect omissions of names must be made; letters of inquiry must be written to some teachers; letters of warning written to some parents; letters of inquiry and to secure co-operation written sometimes to acting school visitors. Nor may letters be written in bulk nor after a stereotyped form. Letters to parents must be in detail, courteous but firm; letters of inquiry to teachers must show that the previous report has been digested; letters to acting school visitors must be real efforts at co-operation, not general in terms nor vague in purport. Add to all this labor the work of making a memorandum of every letter written with indexing for future easy reference, and it will be seen that the amount of desk work is not inconsiderable.

So much desk work as this would preclude other work were it not for the fact that the full routine need not be given to every town every month. A town which has been thoroughly canvassed in November, its teachers seen, its schools visited, its worst cases warned, may be safely left in December with a few letters of inquiry or repeated warning. In January and even February it will generally seem unnecessary to make a full recanvassing. In this way an agent may reduce his desk-work to the minimum.

While his pen-work is important an agent does not forget that his best work is done in the field. To visit a town with the approval and co-operation of its acting school visitor ; to mentally appraise the character of the soil and the apparent prosperity of the homes ; to get the geographical picture of the location of the schoolhouse and the difficulty or ease of access ; to meet teachers in their schoolrooms, and to judge of the mental and temperamental qualities likely to appear in their reports ; to inspect register and to question pupil and teacher as to cause of past delinquencies on the spot ; to see pupils at work, and to judge in general of their home training and heredity, to sally forth to knock at the door of homes of delinquents ; to meet parents eye to eye and state the law; to prosecute whenever necessary, and to avoid prosecution wherever possible ;—this work in the field must always remain the most important part of an agent's duties.

It ought not to go unnoted that the new plan entails harder work ; it entails harder work because it brings the agent into a better understanding of the temptations of parents, and so into a certain sympathy with them. To stand up for the defrauded child notwithstanding, to let the law have its free course and be glorified, is no light task. An agent sees sometimes that he has made mistakes; strict justice would have demanded severity; but if the after results are good he forgives himself his forbearance.

THE THING MOST NEEDED

In my report in 1897, I said that the one chief objection to the compulsory law is, that it enforces attendance upon characterless schools. I have to report in 1898 that that one objection remains the one chief objection to the law. If an agent might feel that the schools into which he presses little children were worthy of little children, his work would be a joy. If there were warmth within to attract as well as severity without to compel, the work would be doubly effective. If acting school visitors would devise and nurse to success some plan of gradation, of emulation, whereby the ambition and interest of the pupils could be aroused, the work of the agent would be easier and the schools themselves would be better. In supervised schools, where the temptation is to talk too much of gradation, promotion, and examination, this want is not apparent, but in ungraded and unsupervised schools it is the one chief lack.

As a suggestion of what is meant, reference is made to the well-worn plan of a "Roll of Honor." Even in graded schools this plan is used. The object is, of course, to arouse the ambition of the child to regularity and punctuality of attendance, to propriety of conduct, and to studiousness. The fact that his name is on the Roll of Honor, that his acting school visitor will see it there next time he comes, that father knows it is there, that mother is coming to visit the school on the last day and will see it, that it will

be printed in the newspaper, and possibly be read at a June gathering of all the schools of the town,—facts like these will have their influence with some, not all, the pupils of a country town. All this is referred to acting school visitors for their kindly consideration.

Still farther to show what is meant, and as a suggestion merely, the following draught of a circular to be printed and sent to every home is offered :

Public Schools of the Town of ———

THE ROLL OF HONOR

The school year is divided into three terms. The first term begins ——— — and ends ——— —; the second term begins ——— and ends ——— —; the fourth term begins ——— — and ends ——— —. Beginning with the first day of each term teachers will keep in their registers, for the inspection of the acting school visitor and others, a list of pupils who, from that date to the end of the term, or so long as they shall remain pupils of the school, shall not have been absent a single half day.

Pupils who are absent because of sickness, deep snows, heavy rains, extreme weather, the death of relatives, or lack of clothes (provided the absence be not long continued), may be excused by the teacher for such absence, and the name restored to the Roll of Honor, upon the request of the absentee or his parent. But the teacher shall not have power to excuse more than two such absences. More than two such absences may be referred to the acting school visitor, who, upon investigation, may restore the name to the roll.

The name of no pupil between 8 and 14 who is absent from school for pleasure or for work, the name of no pupil of any age who uses profane or indecent language in the streets or on the school ground, who is not respectful to his elders, courteous to his mates, and kind to those younger, who is not cleanly in person, and does not keep his books and desk in good order, shall appear upon the Roll of Honor.

———————
———————
——————— } *Acting School Visitors.*

TABLE XXXII

Towns	No. of Cases of Absence investigated	No. of Families visited	Recognized excuses: No. of Cases of Disability	Recognized excuses: No. of Cases of Lack of Clothing	Recognized excuses: No. at Work legally	No. Absent illegally	No. at Work illegally	No. Sent to School	Prosecutions: Parents	Prosecutions: Employers	No. of Truants	No. sent to Connecticut School for Boys	No. sent to Industrial School for Girls	No. Sent to Temporary Homes	Letters written to Parents	Visits to Schools
Avon	8	8	2	3	....	2	..	3	....	....	....	....	....	....	5	7
Barkhamsted	11	1	3	...	....	7	....	7	....	....	....	....	...	....	17	3
Berlin	31	27	1	4	2	23	1	21	....	....	1	1	....	..	16	21
Bloomfield	8	7	....	...	....	8	....	8	....	....	....	....	....	.. .	12	10
Burlington	....	....	...	....	....	....	....	....	....	....	....	....	...	....	6	9
Canton	25	21	5	2	4	8	5	4	....	....	1	....	....	....	4	35
Colebrook	2	....	....	....	1	1	....	1	....	....	...	....	....	....	17	....
East Granby	2	2	..	....	....	2	.. ..	2	....	...	....	...	....	....	2	6
Goshen	11	2	....	....	1	10	....	8	....	....	....	....	....	....	17	3
Granby	21	14	4	2	2	11	1	13	...	....	....	....	....	....	11	6
Hartland	9	....	4	....	...	3	2	5	....	....	...	....	....	....	16	2
New Britain	9	9	3	....	....	4	1	4	....	....	2	....	....	....	3	12
New Hartford	37	32	6	4	1	21	2	19	1	....	...	....	....	....	10	35
Newington	2	3	1	....	....	1	....	1	....	....	....	....	....	....	6	4
Simsbury	13	11	1	....	1	9	2	6	...	....	....	....	....	...	4	10
West Hartford	6	6	3	....	1	2	....	1	....	....	..	....	....	...	....	6
Winchester	28	14	5	....	2	17	2	18	....	....	2	....	....	....	40	16
Totals	223	157	38	15	15	129	16	121	1	...	6	1	....	....	186	185

The foregoing table shows the work done as far as figures can show it. Some explanation of the items seems necessary. "Cases investigated" refers to instances where the cause of absence is thought to be fairly well understood. Some cases holding over from last year are not included as investigated in this report.

"Families visited" does not include letters written, as last year; find "letters written" in another column. A very large share of the work done has been done by mail; the mail, when successful, is far less expensive than the personal visit.

"Sent to school" does not include, or often include, cases of irregularity which are already on the school register.

"Visits to schools" includes visits to separate rooms in graded schools. In the town of Burlington the teachers were seen at a town teachers' meeting and not in their schoolrooms.

In Canton the agent discovered a class of thirty-five regularly dismissed at about 11.30 A. M., "to carry dinner." Upon his petition the local authorities voted to close the morning session at 11.30, to extend slightly the length of the afternoon session, and to direct teachers to refuse all future like requests for dismissal.

M. A. WARREN.

MR. CHARLES D. HINE,
Secretary of the State Board of Education.

SIR:—I have the honor to submit herewith a report of my work during the seven months I have been in service as an agent of the Board. I have canvassed the towns of Bristol, Cheshire, Farmington, Prospect, Plymouth, Plainville, Southbury, Southington, Thomaston, Wolcott, and Watertown, and part of Roxbury, visiting 97 schools, and, by comparing the enumeration lists with the school registers, found out if all children of school age were attending school according to law. I also visited 87 manufactories for the purpose of ascertaining if any children were employed in violation of the law. I found five thus employed. These were sent to school, and no prosecutions were brought, the circumstances in each case being such that the object of the law could be attained without. All the teachers in the above-named towns, and also in Wallingford, have been furnished with blanks for monthly reports of attendance, and as these have been received by the agent, the reported cases of irregular attendance have been investigated either by letter or in person, and I am gratified to learn from teachers and school officers throughout the whole field that this work has caused an improvement in attendance. In most cases teachers and school officers have cheerfully coöperated with the agent, although there have been a few cases where the work has been grudgingly given. Legislation making reports required by the Board or the agents obligatory would be an advantage in this work. Another want of legislation arises from the unwillingness of some local authorities to prosecute cases of violation of the laws relating to school attendance. If the agents of the Board were given the powers of grand jurors in such cases as is done to agents for the prosecution of cases of inhumanity to persons and animals and violations of the liquor laws, the law could be better enforced. Not so much trouble exists from entire absence from school as from irregular attendance. Parents keep their children from school to assist in field and housework, and it is difficult to make them understand that they have no right to do so. Some parents take their children from school before the close of the sessions, thus depriving them of a portion of their school time each day. In most cases where the law has been explained to such parties, they have acquiesced in the law and obeyed its requirements. It is a duty that the State owes to itself and the children within its borders that they should be kept from illiteracy,

and any attempt to deprive any of them of an education should be punished as readily as it would be done if they were deprived of food or clothing.

A summary of my work is as follows:

Cases of irregular attendance investigated	638
Schools visited	97
Manufactories visited	87
Towns canvassed	13
Prosecutions	1

FREDERICK DOOLITTLE.

MR. CHARLES D. HINE,
Secretary of the State Board of Education.

SIR: — The following is a report of my work for the State Board of Education from November, 1897, to June, 1898, — a time of seven months.

My work has mainly been in enforcing attendance, as very few are employed in factories in the territory assigned to me. Monthly reports of attendance were received from fifteen towns, and compared with the enumeration lists. The teachers in these towns numbered from 175 to 200, and nearly all regularly sent a record of the month. In this way the irregular attendants, as well as the absentees, are found. All families that appeared to be negligent in regard to observing the laws relating to school attendance were notified by a copy of the laws, which was followed by correspondence or by a call, as seemed necessary. Several of the towns had been canvassed in the same manner the year before, and the attendance was very much better than in the towns where nothing had been done.

In a majority of the cases a notice received from a representative of the State Board will remedy the irregularity, for a time at least. The families that pay no attention to a notification are the difficult ones to deal with, and the ones that need the most attention. They are a poor, shiftless class, and have an advantage of the agent in the start. The only thing that can ever bring them out of their low condition is constant attention to the rearing of their children, and the earlier in age they are put under the influence of the public school, the better for the future of the community and the State. In many cases the work will not end with the first generation, but will require great care and attention for a long time. It seems far better and more economical to care for the child for a few years of his earlier years than to support him in his advanced years and allow his children and grandchildren to follow in his footsteps.

In every town families can be found where one or both of the parents are ignorant, and the children are not compelled to attend school. About the only way to compel them to attend regularly

is to bring a prosecution, and this is a difficult matter in many towns, as the parent will be unable to pay the fine and costs if the counts are proved, and the officers of the town dislike to make extra expense. These are the important cases, and the hardest to contend with.

The cases that need the most attention are found among a floating population that is always moving from place to place. Names will appear on the enumeration list of a town, but do not seem to be in attendance at any school. By the time they can be located and sent to school, they are ready to move again, and the work must be repeated. Even then so much time will elapse in the moving and getting settled and being placed in different schools, that when the year is ended they have made but little advance. This is the class that grow up ignorant and shiftless. When they learn that constant attendance at school is one of the actual requirements of the State at the present time, this condition will gradually change.

In the towns that have not been canvassed thoroughly in some manner, either by the officers of the town or under the direction of the State Board, the people are not familiar with the requirements of the statute. I have often heard people say that this law was passed in the 1897 session of the Legislature, while in reality it was passed ten years before.

The second class of delinquents is the children of the foreigners in the rural districts that are large enough to be of some service to their parents, but have not reached the legal age. Generally they comply with the provisions of the statute when they know the requirements. To determine the actual age of the child is one of the most important parts of the work. Those who wish to elude the law can readily state an age which can with difficulty be disputed in the absence of any record. A great many cases have been found where a child was claimed to be older than the enumeration would show. For instance, the enumeration of a certain town shows a girl to be thirteen years of age. The parents, when interviewed, claimed that she was fourteen, and the girl represented to the superintendent of the factory where she worked that she was sixteen. No record of her birth could be found, and previous school registers were not accessible, if in existence. The parents were fined for neglect to send the child to school, the justice accepting the former statements of the parents to the enumerator in place of the later ones. As the work is now carried on by the agent a record is kept of the child's age in years and date of birthday, so that in a great many cases it will be impossible for a child to skip the thirteenth year, as is now quite often the case.

It is impossible to show by a table the amount of work done. One case represented as investigated and sent to school may only mean a letter written to the parents or grand juror of the

town, while another represented in the same column may mean several visits or a prosecution.

Number of towns visited		15
Number of cases investigated		459
Number of families visited		213
Number of schools visited		*110
Number absent under legal excuse:		
Disability	38	
Lack of clothing	12	
At work	180—	230
Number absent illegally		289
Number sent to school		266
Number sent to Connecticut School for Boys		3
Number of factories visited		11
Prosecutions of parents		12
Truants		9

The difference in the number of those illegally absent and those sent to school may be accounted for in several ways. Some of these are children that might be considered physically unable to attend, as they are young children that were unable to attend the school provided for them on account of the distance, and the towns not seeing fit to transport them. A few are those taught at home, but not registered. A few are cases where certain conditions existed over which the agent had no control.

Respectfully submitted,

JOHN M. WADHAMS.

* Number of different schools, and not the whole number of visits.

ENFORCEMENT OF LAWS RELATING TO ATTENDANCE AND LABOR.

The following tables (xxxiii and xxxiv), compiled from the reports of agents, show in detail the work of enforcing the attendance and labor laws:

TABLE XXXIII — ENFORCEMENT OF LAW RELATING TO ATTENDANCE, 1897-8

TOWNS	Number of cases of absence investigated	Number of families visited	Recognized excuses: Number of cases of disability	Recognized excuses: Number cases of lack of clothing	Recognized excuses: Number at work legally	Number absent illegally	Number at work illegally	Number sent to school	Prosecutions: Parents	Prosecutions: Employers	Number of truants	Number sent to Conn. School for Boys	Number sent to Industrial School for Girls	Number sent to Temporary Homes
HARTFORD COUNTY														
Avon	8	8	2	3	....	2	....	3	....	....	....	....	....	....
Berlin	31	27	1	4	2	23	1	21	....	....	1	1	....	....
Bloomfield	8	7	....	....	....	8	....	8	....	....	....	....	....	....
Bristol	87	71	....	4	....	82	2	82	1	....	....	....	....	....
Canton	25	21	5	2	4	8	5	4	....	....	1	....	....	....
East Granby	2	2	....	....	....	2	....	2	....	....	....	....	....	....
East Hartford	3	2	....	....	....	3	....	3	....	....	....	....	....	....
East Windsor	39	24	3	....	....	35	1	36	....	....	....	....	....	....
Enfield	16	8	....	....	1	18	1	16	....	....	....	....	....	....
Farmington	24	22	....	....	....	24	....	24	....	....	....	....	....	....
Glastonbury	77	40	3	4	2	50	....	46	....	....	....	....	....	....
Granby	21	14	4	2	2	11	1	13	....	....	....	....	....	....
Hartland	9	....	4	....	....	3	2	5	....	....	....	....	....	....
Manchester	1	1	....	....	....	1	....	1	....	....	....	....	....	....
New Britain	9	9	3	....	....	4	1	4	....	....	2	....	....	....
Newington	2	3	1	....	....	1	....	1	....	....	....	....	....	....
Plainville	9	6	....	....	....	9	4	9	....	....	....	....	....	....
Rocky Hill	24	13	....	....	....	17	....	17	....	....	....	....	....	....
Simsbury	13	11	1	....	1	9	2	6	....	....	....	....	....	....
Southington	35	30	1	....	....	34	....	34	....	....	....	....	....	....
South Windsor	1	1	....	....	1	....	....	....	....	....	....	....	....	....
West Hartford	6	6	3	....	1	2	....	1	....	....	....	....	....	....
Wethersfield	3	2	....	....	....	3	....	3	....	....	....	....	....	....
Total, 23 towns	453	328	31	19	14	349	20	339	1	....	4	1	....	....
NEW HAVEN COUNTY														
New Haven	250	195	31	33	330	140	4	140	3	....	4	....	....	....
Ansonia	23	19	2	3	46	11	....	11	....	....	6	2	....	....
Cheshire	12	9	....	....	....	12	....	12	....	....	....	....	....	....
Derby	13	7	....	3	19	10	....	10	....	....	....	....	....	....
East Haven	13	5	1	3	2	9	....	9	1	....	....	....	....	....
Guilford	24	16	1	1	2	21	....	21	....	....	....	....	....	....
Hamden	53	29	13	2	15	34	....	34	1	....	6	2	....	....
Madison	7	4	2	....	....	5	....	5	1	....	....	....	....	....
Meriden	29	19	4	2	46	19	1	19	2	....	....	....	....	....
Milford	14	8	1	1	8	10	....	10	1	....	2	1	....	1
Naugatuck	14	12	1	1	41	10	....	10	....	....	5	....	....	....
North Branford	17	10	2	....	1	14	....	14	3	....	....	....	....	....
North Haven	3	2	....	....	2	3	....	3	1	....	....	....	....	....
Orange	10	7	2	....	6	8	....	8	....	....	....	....	....	....
Prospect	14	7	....	....	....	8	....	8	....	....	....	....	....	....
Southbury	65	31	....	....	....	65	....	65	....	....	....	....	....	....
Wallingford	108	86	2	1	1	105	....	105	1	....	....	....	....	....
	11	9	1			9		9						
Waterbury	32	19	8	2	324	16	2	16	....	1	2	....	....	....
Wolcott	20	11	2	....	....	18	....	18	....	....	....	....	....	....
Total, 19 towns	732	505	73	52	843	527	7	527	14	1	25	5	....	1
NEW LONDON COUNTY														
New London	2	2	....	....	1	1	....	1	....	....	....	....	....	....
Norwich	13	6	....	....	....	11	....	11	1	....	....	....	....	....
Bozrah	13	9	5	2	....	3	1	4	....	....	....	....	....	....
Colchester	36	19	5	2	....	28	....	28	....	....	....	....	....	....
East Lyme	8	6	1	....	1	6	1	6	1	....	....	....	....	....
Griswold	10	9	....	3	1	5	....	8	....	....	....	....	....	....
Groton	24	16	....	10	....	17	4	22	4	....	....	....	....	3
Lebanon	53	15	1	....	5	41	....	25	....	....	....	....	....	....
Lisbon	2	2	....	....	....	2	....	2	....	....	....	....	....	....
Lyme	1	1	....	....	....	....	....	....	....	....	....	....	....	....
Montville	6	5	....	....	1	5	2	5	....	....	....	....	....	....
North Stonington	18	7	....	6	....	11	....	11	....	....	....	....	....	....
Old Lyme	5	2	....	2	....	3	....	3	2	....	....	....	....	2
Preston	3	2	....	....	....	1	....	1	....	....	....	....	....	....
Salem		5	1	3	....	12	....	12	....	....	....	....	....	....
Sprague	7	1	1	....	....	....	....	....	....	....	....	....	....	....
Stonington	21	23	2	1	3	8	4	11	....	....	1	....	....	....
Voluntown	22	2	1	....	....	1	....	1	....	....	....	....	....	....
Total, 18 towns	244	132	17	29	12	155	12	151	8	....	1	....	....	5

TABLE XXXIII — ENFORCEMENT OF LAW RELATING TO ATTENDANCE, 1897-8 — *Continued*

TOWNS	Number of cases of absence investigated	Number of families visited	Recognized excuses: Number of cases of disability	Recognized excuses: Number cases of lack of clothing	Recognized excuses: Number at work legally	Number absent illegally	Number at work illegally	Number sent to school	Prosecutions: Parents	Prosecutions: Employers	Number of truants	Number sent to Conn. School for Boys	Number sent to Industrial School for Girls	Numbers sent to Temporary Homes
FAIRFIELD COUNTY														
Bridgeport	17	14	2	....	340	11	4	11	....	....	....	....	....	....
Brookfield	4	2	....	....	....	4	....	....	....	....	....	....	....	....
Easton	11	6	1	....	....	9	....	9	....	....	....	....	....	....
Fairfield	55	35	1	....	6	44	....	44	3	....	2	2	....	....
Greenwich	13	9	2	2	12	9	....	9	....	....	....	....	....	....
Huntington	12	8	1	2	51	8	....	8	....	....	....	....	....	....
Monroe	9	....	....	....	....	....	....	....	....	....	....	....	....	....
New Fairfield	2	2	....	....	....	2	....	2	....	....	....	....	....	....
Newtown	17	7	....	3	1	11	....	11	....	....	1	....	....	....
Norwalk	56	43	8	1	59	37	....	37	3	....	4	2	....	....
Ridgefield	7	1	....	1	1	4	....	4	....	....	....	....	....	....
Stamford	72	48	6	9	20	45	....	45	2	....	8	2	....	4
Stratford	14	11	....	....	3	7	....	7	3	....	....	....	....	....
Trumbull	6	2	....	....	....	6	....	6	....	....	....	....	....	....
Weston	18	7	....	....	1	16	....	16	....	....	....	....	....	....
Westport	4	4	....	....	7	4	....	4	....	....	....	....	....	....
Wilton	2	....	....	....	....	2	....	....	....	....	....	....	....	....
Total, 17 towns	319	199	21	18	501	219	4	213	11	....	15	6	....	4
WINDHAM COUNTY														
Brooklyn	37	26	5	5	2	6	....	6	....	....	....	....	....	....
	8	7				8		8						
Chaplin	3	1	....	....	....	3	....	3	....	....	..	....	....	....
Eastford	9	4	1	....	...	1	....	1	....	....	....	....	....	....
Hampton	3	1	....	....	....	3	....	3	....	....	....	....	....	....
Killingly	28	20	2	1	1	17	1	17	....	....	....	....	....	....
Plainfield	15	7	....	5	....	9	....	14	....	....	1	....	....	....
Pomfret	6	2	....	....	....	6	....	6	....	....	....	....	....	....
Putnam	20	11	2	....	....	9	....	10	....	....	....	....	....	....
Scotland	3	2	2	....	....	1	....	1	....	....	....	....	....	....
Thompson	4	4	....	....	....	4	....	4	....	....	....	....	....	....
Windham	13	12	1	1	....	11	3	12	....	....	3	...	....	....
Woodstock	9	6	2	2	....	1	....	7	2	....	....	....	....	....
Total, 12 towns	158	103	15	14	3	79	4	92	2	....	4	....	....	....
LITCHFIELD COUNTY														
Litchfield	42	13	4	....	21	18	....	18	....	....	....	....	....	....
Barkhamsted	11	1	3	....	....	7	....	7	....	....	....	....	....	
Bethlehem	6	2	1	....	7	6	....	2	....	....	....	....	....	....
Bridgewater	13	....	4	....	7	8	....	8	....	....	....	....	....	....
Canaan	15	5	1	....	8	13	....	13	...	....	....	....	....	....
Colebrook	2	....	....	....	1	1	....	1	....	....	....	....	....	....
Cornwall	37	6	7	....	9	17	....	17	....	....	....	....	....	....
Goshen	11	2	....	....	1	10	....	8	....	....	....	....	....	....
Harwinton	38	16	2	1	22	23	....	21	2	....	....	....	....	....
Kent	26	5	....	....	5	18	....	18	....	....	....	....	....	....
Morris	5	4	2	....	3	1	....	1	1	....	....	2	....	....
New Hartford	37	32	6	4	1	21	2	19	1	....	....	....	....	....
New Milford	45	24	....	1	2	20	....	16	3	....	....	....	....	....
	20	8				17		17						
Norfolk	31	13	4	...	13	23	....	23	2	....	....	....	....	....
North Canaan	15	5	2	....	12	9	....	8	....	....	....	....	....	....
Plymouth	52	41	....	....	....	52	....	52	....	....	....	....	....	....
	3	3				1		1						
Roxbury	22	12	....	....	....	22	....	22	....	....	....	....	....	....
Salisbury	91	38	1	3	17	33	....	29	2	....	3	1	....	....
Sharon	40	5	1	....	9	8	....	8	1	....	....	....	....	....
Thomaston	31	26	....	....	1	30	1	30	....	....	....	....	....	....
Torrington	140	73	8	3	40	69	....	64	1	....	5	....	....	....
Warren	8	....	....	....	4	5	....	4	....	....	....	....	....	....
Washington	37	4	1	4	1	18	....	15	....	....	1	....	....	....
Watertown	81	14	1	....	....	80	....	80	....	....	....	....	....	....
Winchester	28	48	5	....	2	17	2	18	....	....	2	....	....	....
Woodbury	79	42	....	1	....	78	....	78	....	....	....	....	....	....
Total, 26 towns	966	442	53	17	186	625	5	598	13	....	11	3	....	....

TABLE XXXIII — ENFORCEMENT OF LAW RELATING TO ATTENDANCE, 1897-8 — *Continued*

TOWNS	Number of cases of absence investigated	Number of families visited	Recognized excuses: Number of cases of disability	Recognized excuses: Number cases of lack of clothing	Recognized excuses: Number at work legally	Number absent illegally	Number at work illegally	Number sent to school	Prosecutions: Parents	Prosecutions: Employers	Number of truants	Number sent to Conn. School for Boys	Number sent to Industrial School for Girls	Number sent to Temporary Homes
Middlesex County														
Middletown	21	23	4	1	86	23	1	23	....	....	....	....	....	....
Haddam	3	....	....	....	....	1	....	1	....	....	....	....	....	....
Chester	3	2	....	....	....	3	....	3	....	....	....	....	....	....
Cromwell	58	33	3	4	10	38	....	38	....	....	....	....	....	....
East Haddam	11	4	1	....	4	5	....	5	....	....	....	....	....	....
Essex	3	1	....	....	7	1	1	1	....	....	..	....	....	....
Killingworth	9	5	....	....	....	7	....	7	3	..	....	....	....	....
Portland	35	29	2	2	1	15	....	16	....	....	....	....	....	....
Saybrook	1	1	....	....	....	1	....	....	....	....	....	....	....	....
Westbrook	2	1	....	....	....	1	....	1	....	....	....	....	....	....
Total, 10 towns	146	99	10	7	108	95	2	95	3	....	....	....	....	....
Tolland County														
Tolland	8	5	1	....	1	5	....	5	....	....	....	....	....	....
Andover	7	1	....	....	....	1	....	1	....	....	....	....	....	....
Bolton	2	....	....	....	....	....	....	....	....	....	....	....	....	....
Columbia	11	3	....	....	1	10	....	9	....	....	....	....	....	....
Coventry	20	9	....	....	1	13	....	10	....	....	....	....	....	....
Ellington	1	1	....	....	....	....	....	....	....	....	....	....	....	1
Hebron	25	13	1	....	4	19	....	17	....	....	....	....	....	....
Mansfield	28	9	4	....	1	19	....	19	....	....	....	....	....	....
Somers	11	8	....	....	1	10	....	10	....	....	....	....	....	....
Union	24	10	....	....	....	17	....	7	....	....	....	....	....	....
Vernon	2	1	....	....	....	2	....	2	....	....	....	....	....	....
Willington	4	4	1	....	....	2	2	3	....	....	....	....	....	....
Total, 12 towns	143	64	7	....	9	98	2	83	....	....	....	....	....	1

SUMMARY

COUNTIES	Number towns	Number of cases of absence investigated	Number of families visited	Recognized excuses: Number of cases of disability	Recognized excuses: Number cases of lack of clothing	Recognized excuses: Number at work legally	Number absent illegally	Number at work illegally	Number sent to school	Prosecutions: Parents	Prosecutions: Employers	Number of truants	Number sent to Conn. School for Boys	Number sent to Industrial School for Girls	Number sent to Temporary Homes
Hartford	23	453	328	31	19	14	349	20	339	1	....	4	1	....	....
New Haven	19	732	505	73	52	843	527	7	527	14	1	25	5	....	1
New London	18	244	132	17	29	12	155	12	151	8	....	1	....	....	5
Fairfield	17	319	199	21	18	501	219	4	213	11	....	15	6	....	4
Windham	12	158	103	15	14	3	79	4	92	2	....	4	....	....	....
Litchfield	26	966	442	53	17	186	625	5	598	13	....	11	3	....	....
Middlesex	10	146	99	10	7	108	95	2	95	3	....	....	....	....	....
Tolland	12	143	64	7	....	9	98	2	83	....	....	....	....	....	1
Total	137	3161	1872	227	156	1676	2147	56	2098	52	1	60	15	....	11

TABLE XXXIV — ENFORCEMENT OF CHILD LABOR LAW, 1897-8

TOWNS	Establishments		Children under 14 Years of Age			Certificates of Age			Children 14 to 16		Have local authorities acted	School accommodations	Reading-room	Evening School
	Visited	Inspected	Number employed	Number discharged	Prosecutions for employing	Town Clerk	Teacher	Parent	Number employed	Cannot read and write				
Hartford Co.														
Hartford	24	19	.....	.....	.....	23	35	11	153	.....	No	Yes	Yes	Yes
Bristol	24	24	1	1	.....	.....	7	.....	.....	.....	Yes	Yes	Yes	No
East Windsor	2	2	.....	.....	.....	.....	6	1	41	.....	No	Yes	No	No
Enfield	4	3	1	1	.....	10	20	12	50	.....	No	Yes	No	No
Farmington	8	7	.....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Glastonbury	5	3	.....	.....	.....	.....	7	.....	15	.....	No	Yes	No	No
Manchester	4	3	.....	.....	.....	.....	.....	.....	97	.....	No	Yes	No	No
New Britain	18	15	2	2	.....	3	47	6	191	28	Yes	Yes	Yes	Yes
Plainville	8	8	4	4	.....	.....	3	.....	18	.....	No	Yes	No	No
Simsbury	2	2	.....	.....	.....	.....	1	....	8	.....	No	Yes	.....	No
Southington	14	14	.....	.....	.....	.....	.....	.....	7	.....	No	Yes	No	No
Windsor	1	1	.....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Windsor Locks	6	4	.....	.....	.....	.....	4	3	19	5	No	Yes	No	No
Total, 13 towns	120	105	8	8	.....	36	130	33	603	33	.....	.....	.....	.....
N. Haven Co.														
New Haven	63	57	5	5	.....	.....	20	10	299	10	No	Yes	No	Yes
Ansonia	12	11	.....	.....	.....	.....	3	.....	46	.....	No	Yes	No	Yes
Branford	2	1	.....	.....	.....	.....	.....	.....	9	.....	No	Yes	No	No
Cheshire	3	3	.....	.....	.....	.....	.....	.....	.....	.....	No	Yes	No	No
Derby	4	3	.....	.....	.....	.....	2	1	19	.....	No	Yes	No	No
Guilford	1	1	.....	.....	.....	.....	.....	.....	1	.....	No	Yes	No	No
Hamden	5	5	.....	.....	.....	.....	.....	.....	11	.....	No	Yes	No	No
Meriden	19	14	1	.....	.....	.....	10	.....	42	.....	No	Yes	No	Yes
Milford	2	2	.....	.....	.....	.....	.....	.....	7	.....	No	Yes	No	No
Naugatuck	11	11	.....	.....	.....	.....	5	.....	39	1	No	Yes	No	No
North Haven	1	.....	.....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Orange	4	3	.....	.....	.....	.....	.....	.....	6	.....	No	Yes	No	No
Prospect	1	1	.....	.....	.....	.....	.....	.....	.....	.....	No	Yes	No	No
Seymour	8	6	.....	.....	.....	.....	5	.....	21	1	No	Yes	No	No
Southbury	.....	.....	.....	.....	.....	.....	10	.....	38	.....	No	Yes	No	No
Wallingford	17	15	.....	.....	.....	.....	.....	.....	.....	.....	.....	Yes	No	.....
Waterbury	43	39	2	2	1	4	117	2	320	10	No	Yes	No	Yes
Wolcott	1	1	.....	.....	.....	.....	.....	.....	.....	.....	No	Yes	No	No
Total, 18 towns	197	173	8	7	1	4	172	13	860	22	.....	.....	.....	.....
N. London Co.														
New London	.....	4	.....	.....	.....	.....	.....	.....	15	.....	.....	.....	.....	.....
Norwich	.....	13	.....	.....	.....	13	43	60	147	.....	.....	.....	.....	.....
Bozrah	1	1	.....	.....	.....	1	.....	.....	1	.....	No	Yes	No	No
East Lyme	.....	1	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....
Griswold	1	3	.....	.....	.....	.....	16	5	38	.....	.....	.....	.....	.....
Lebanon	1	1	.....	.....	.....	.....	.....	.....	.....	.....	No	Yes	No	No
Montville	.....	7	.....	.....	.....	.....	5	.....	61	.....	.....	.....	.....	.....
Preston	.....	3	.....	.....	.....	.....	.....	.....	12	.....	.....	.....	.....	.....
Sprague	.....	1	.....	.....	.....	.....	6	2	8	.....	.....	.....	.....	.....
Stonington	.....	6	.....	.....	.....	3	16	2	48	.....	.....	.....	.....	.....
Voluntown	.....	3	.....	.....	.....	.....	.....	.....	13	.....	.....	.....	.....	.....
Total, 11 towns	3	43	.....	4	.....	17	86	69	345	.....	.....	.....	.....	.....

TABLE XXXIV — ENFORCEMENT OF CHILD LABOR LAW, 1897-8 — *Continued*

TOWNS	Establishments		Children under 14 Years of Age			Certificates of Age			Children 14 to 16					
	Visited	Inspected	Number employed	Number discharged	Prosecutions for employing	Town Clerk	Teacher	Parent	Number employed	Cannot read and write	Have local authorities acted	School accommodations	Reading-room	Evening School
Fairfield Co.														
Bridgeport	58	48	4	.....	.....	.....	9	8	337	15	No	Yes	Yes	Yes
Danbury	9	8	.....	.....	.....	.....	.....	.....	23	.....	No	Yes	No	Yes
Bethel	11	8	.....	.....	.....	.....	.....	.....	4	.....	No	Yes	No	No
Greenwich	2	2	.....	.....	.....	2	4	6	12	.....	No	Yes	No	No
Huntington	16	15	.....	.....	.....	1	10	.....	51	1	No	Yes	No	No
Newtown	3	3	.....	.....	.....	.....	.....	.....	1	.....	No	Yes	No	No
Norwalk	13	10	.....	.....	.....	20	14	2	53	2	No	Yes	Yes	Yes
Stamford	3	3	.....	.....	.....	.....	.....	.....	15	2	No	Yes	No	Yes
Westport	8	8	.....	.....	.....	.....	.....	.....	7	.....	No	Yes	No	No
Total, 9 towns	123	105	4	.....	.....	23	37	16	503	20	.....	.....	.....	.....
Windham Co.														
Brooklyn	.....	*1	.....	.....	.....	.....	22	19	36	.....	.....	.....	.....	.....
Killingly	.....	12	1	1	.....	1	14	8	39	.....	.....	.....	.....	.....
Plainfield	.....	6	.....	.....	.....	.....	9	25	84	.....	.....	.....	.....	.....
Putnam	.....	10	.....	.....	.....	7	15	17	71	.....	.....	.....	.....	.....
Sterling	1	1	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....
Thompson	.....	4	.....	.....	.....	.....	14	39	97	.....	.....	.....	.....	.....
Windham	.....	9	.....	.....	.....	1	48	15	128	.....	.....	.....	.....	.....
Total, 7 towns	1	43	1	1	.....	9	122	123	458	.....	.....	.....	.....	.....
Litchfield Co.														
New Hartford	4	4	.....	.....	.....	.....	31	3	40	7	No	Yes	No	No
New Milford	1	1	1	1	.....	.....	.....	.....	1	.....	No	Yes	No	No
Norfolk	1	1	.....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Plymouth	3	3	.....	.....	.....	.....	.....	.....	3	.....	No	Yes	No	No
Salisbury	1	1	.....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Thomaston	2	2	.....	.....	.....	.....	10	.....	31	.....	No	Yes	No	No
Torrington	8	8	1	1	.....	.....	6	8	41	1	No	Yes	No	No
Watertown	4	3	.....	.....	.....	.....	.....	.....	7	.....	No	Yes	No	No
Winchester	12	10	.....	.....	.....	....	5	1	26	.....	Yes	Yes	No	No
Woodbury	3	3	.....	.....	.....	.....	.....	.....	13	.....	No	Yes	No	No
Total, 10 towns	39	36	2	2	.....	.....	52	12	166	8	.....	.....	.....	.....
Middlesex Co.														
Middletown	20	19	1	1	.....	1	23	6	85	3	No	Yes	No	Yes
Haddam	3	2	.....	.....	.....	.....	2	1	6	.....	.....	.....	.....	.....
Chatham	7	7	....	.. .	.....	1	.....	1	8	.....	No	Yes	No	No
Cromwell	1	1	.....	.....	.....	.....	.....	.....	1	.....	No	Yes	No	No
East Haddam	5	5	.....	.....	.....	.....	.....	.....	4	.....	No	Yes	No	No
Essex	4	4	1	1	.....	.....	.....	....	7	.....	No	Yes	No	No
Middlefield	2	2	.....	.....	.....	.....	.....	.....	6	1	No	Yes	No	No
Portland	2	2	1	1	.....	.....	8	... .	21	.....	No	Yes	No	No
Saybrook	3	2	....	.....	.....	.....	.....	.....	2	.....	No	Yes	No	No
Total, 9 towns	47	44	3	3	.....	2	33	8	140	4	.....	.....	.....	.....

TABLE XXXIV — ENFORCEMENT OF CHILD LABOR LAW, 1897-98 — *Continued*

TOWNS	Establishments		Children under 14 Years of Age			Certificates of Age			Children 14 to 16		Have local authorities acted	School accommodations	Reading-room	Evening School
	Visited	Inspected	Number employed	Number discharged	Prosecutions for employing	Town Clerk	Teacher	Parent	Number employed	Cannot read and write				
Tolland Co.														
Coventry	6	4	.....	.....	.....	1	.....	.....	1	.....	No	Yes	No	No
Hebron	1	1	.....	.....	.....	.....	.....	.....	1	.....	No	Yes	No	No
Mansfield	1	1	.....	.....	.....	.....	.....	.....	3	.....	No	Yes	No	No
Somers	1	1	.....	.....	.....	.....	.....	.....	4	.....	No	Yes	No	No
Stafford	14	11	.....	.....	.....	.....	3	3	35	.....	No	Yes	No	No
Vernon	13	13	.....	.....	.....	10	51	5	114	.....	No	Yes	No	No
Willington	1	1	.....	.....	.....	.....	.....	.....	8	.....	No	Yes	No	No
Total, 7 towns	37	32	....	.....	.....	11	54	8	166	.....	.....	....	....	.....

SUMMARY BY COUNTIES

COUNTY	Number of Towns	Establishments		Children under 14 Years of Age			Certificates of Age			Children 14 to 16	
		Visited	Inspected	Number employed	Number discharged	Prosecutions for employing	Town Clerk	Teacher	Parent	Number employed	Cannot read and write
Hartford	13	120	105	8	8	.....	36	130	33	603	33
New Haven	18	197	173	8	7	1	4	172	13	860	22
New London	11	3	43	.....	4	.....	17	86	69	345	.....
Fairfield	9	123	105	4	.....	.....	23	37	16	503	20
Windham	7	1	43	1	1	.....	9	122	123	458	.....
Litchfield	10	39	36	2	2	.....	.....	52	12	166	8
Middlesex	9	47	44	3	3	.....	2	33	8	140	4
Tolland	7	37	32	.....	.....	.....	11	54	8	166	.....
Total	84	567	581	26	25	1	102	686	277	3212	87

Prosecutions

The following table shows prosecutions under attendance and labor laws during the year 1897–8 :

TABLE XXXV — PROSECUTIONS DURING

Town	Child	Age	Nationality	Person Prosecuted	Offense	Circumstances of Family
Ansonia	boy	14	American	Child	Truancy	.....
	"	13	"	"	Truancy and incorrigibility	Well-to-do
Berlin	"	15	"	"	Truancy	[industrious
Bristol	girl	13	"	Parent	Neglect to cause child to attend school	Mother dead, stepfather Poor
Brookfield	boy	12	"	Child	Immoral conduct	Well-to-do
East Haven	"	12	"	Parent	Neglect to cause child to attend school	Poor
Fairfield	"	13	"	"	Neglect to cause child to attend school	"
	"	14	Irish	"	Neglect to cause child to attend school	Poor and idle
	"	10	"	"	Neglect to cause child to attend school	" "
	"	14	"	Child	Truancy	" "
	"	10	"	"	"	" "
Hamden	"	10	Italian	"	"	Well-to-do
	"	12	"	"	"	Poor
	"	10	Irish	Parent	Neglect to cause child to attend school regularly	Well-to-do
Harwinton	"	11	American	"	Neglect to cause child to attend school	Comfortable
	girl	13	German	"	Neglect to cause child to attend school	"
Killingworth	"	13	"	"	Neglect to cause child to attend school regularly	"
	boy	11	"	"	Neglect to cause child to attend school regularly	"
	"	13	American	"	Neglect to cause child to attend school regularly	"
Madison	"	13	"	"	Neglect to cause child to attend school regularly	Poor and shiftless
Meriden	"	10	Russian	"	Neglect to cause child to attend school regularly	Comfortable
	girl	11	Polish	"	Neglect to cause child to attend school regularly	Poor
Milford	boy	11	American	Child	Neglected by parents—Temporary Home case	Poor and shiftless
	"	12	.....	"	Truancy	Comfortable
	girl	12	Irish	Guardian	Neglect to cause child to attend school	"
Morris	boy	13	"	.....	Truancy and neglected	Very poor
	"	11	"	.....	Truancy and neglected	"
	"	12	American	.....	Truancy and neglected	" father dead
New Hartford	girl	13	German	.....	Neglect to cause child to attend school	Well-to-do
New Haven	"	11	Italian	Parent	Neglect to cause child to attend school	Comfortable
	"	12	Russian	"	Neglect to cause child to attend school	"

THE YEAR ENDING AUGUST 31, 1898

Days in School in 12 months	Court	Results	Town
85	City Court	Judgment suspended	Ansonia
94	"	" "	
....	Justice of Peace	Sent to Connecticut School for Boys	Berlin. .....
12	Town court	Fined $2.00 on one count and judgment suspended on two other counts	Bristol
56	Justice of Peace	Sentenced to Conn. School for Boys. Appealed	Brookfield
11	" "	Fine and costs, $11.35	East Haven
24½	" "	Fine and costs, $8.00	Fairfield
0	" "	Case nolled and boy sent to Conn. Sch. for Boys	
0	" "	Judgment suspended	
0	" "	Sent to Connecticut School for Boys	
0	" "	" " " "	
11	Town Court	Judgment suspended	Hamden
12	"	Sent to Connecticut School for Boys	
150	"	Fine and costs, $15.00	
0	Justice of Peace	Fine $1 and costs; total, $9.48	Harwinton
3	" "	Fine $1.00, costs, $12.70	
72	" "	Nolled — no proof of age	Killingworth
56	" "	Fine and costs, $11.17	
80	" "	" " $12.72	
22	" "	" " $8.46	Madison
128	City Court	" " $12.00	Meriden
47	"	Case nolled — child attended private school	
91	Justice of Peace	Judgment suspended	Milford
68½	" "	Sent to Connecticut School for Boys	
103	" "	Fine $1.00 and costs	
0	" "	Sent to Connecticut School for Boys	Morris
0	" "	" " " "	
0	" "	Judgment suspended — boy sent to school	
....	" "	Fine $1.00 and costs; total, $9.87	New Hartford
150	City Court	Fine $2.00 and costs	New Haven
43	"	Nolled — no proof of age	

TABLE XXXV — PROSECUTIONS DURING THE

Town	Child	Age	Nationality	Person Prosecuted	Offense	Circumstances of Family
New Haven...	boy	12	American	Parent	Neglect to cause child to attend school	Comfortable
New Milford...	"	13	Irish	.....	Truant	Poor; father dead
	"	11	American	.....	Neglect to cause child to attend school	Comfortable
	girl	13	Irish	.....	Neglect to cause child to attend school	Poor
Norfolk	boy	....	Italian	.....	Neglect to cause child to attend school	Comfortable
	"	....	"	.....	Neglect to cause child to attend school	"
North Branford	girl	10	American	Parent	Neglect to cause child to attend school	"
	boy	11	"	"	Neglect to cause child to attend school	Poor
	"	12	"	"	Neglect to cause child to attend school	Comfortable
North Haven..	"	12	German	"	Neglect to cause child to attend school	"
Norwalk	"	13	American	Child	Truancy	Mother widow; poor
	"	12	Hungarian	Parent	Neglect to cause child to attend school	Comfortable
	"	10	"	"	Neglect to cause child to attend school	"
	"	12	American	Child	Truancy	"
	"	11	"	Parent	Neglect to cause child to attend school	Well-to-do
Salisbury	girl	9	Irish	.....	Neglect to cause child to attend school	Very poor
	boy	14	"	.....	Neglect to cause child to attend school	Comfortable
	"	13	"	.....	Truant	[less Mother dead, father shift-
Sharon	"	13	"	.....	Neglect to cause child to attend school	Comfortable
Stamford.....	"	13	American	Child	Truancy	"
	"	13	Irish	"	Neglected by parent—Temporary Home case	Pauper and intemperate
	girl	12	"	"	Neglected by parent—Temporary Home case	.....
	"	10	"	"	Neglected by parent—Temporary Home case	.....
	"	6	"	"	Neglected by parent—Temporary Home case	.....
	boy	13	American	Parent	Neglect to cause child to attend school	Comfortable
	"	13	Italian	"	Neglect to cause child to attend school	"
	"	11	"	Child	Truancy	Poor
Stratford	"	11	"	Parent	Neglect to cause child to attend school	"

YEAR ENDING AUGUST 31, 1898 — CONTINUED

Days in School in 12 Months	Court	Results	Town
65	City Court	Fine and costs, $12.00	New Haven
....	Justice of Peace	Judgment suspended for 30 days. Boy attended [regularly	New Milford
63	" "	" " boy sent to school	
27	" "	" "	
....	" "	Case nolled; child sent to school	Norfolk
....	" "	" " "	
126	" "	Fine and costs $14.50	North Branford
28	" "	" " $10.94	
112	" "	" " $10.94	
64½	" "	" " $7.00	North Haven
0	City Court	Sent to Connecticut School for Boys	Norwalk
75	"	Judgment suspended	
75	"	" "	
80	"	" "	
129	"	Fine $1.00 and costs	
....	Justice of Peace	Fine $1.00, costs $7.46	Salisbury
3	" "	Fine $1.00, costs $7.46	
16	" "	Sent to Connecticut School for Boys	
20	" "	Fine $1.00, costs $7.24	Sharon
4	City Court	Sent to Connecticut School for Boys	Stamford
3½	"	Sent to Temporary Home	
0	"	" " "	
0	"	" " "	
0	"	" " "	
97½	"	Fine $15.00 and costs. Total $25.00	
117½	"	Fine $3.00 and costs. Total, $13.00	
97	"	Judgment suspended	
20	Justice of Peace	Fine $3.00 and costs	Stratford

TABLE XXXV — PROSECUTIONS FOR THE

Town	Child	Age	Nationality	Person Prosecuted	Offense	Circumstances of Family
Stratford.....	boy	13	Irish	Parent	Neglect to cause child to attend school	Comfortable
	"	12	Hungarian	"	Neglect to cause child to attend school	"
Torrington.....	"	13	Irish	.....	Neglect to cause child to attend school	Drunken parents
Wallingford....	"	13	American	Guardian	Neglect to cause child to attend school	Well-to-do
Waterbury	girl	13	Irish	Employer	Employing child under 14 years of age in factory	"

YEAR ENDING AUGUST 31, 1898 — CONTINUED

Days in School in 12 Months	Court	Results	Town
46½	Justice of Peace	Fine $3.00 and costs	Stratford
85½	" "	" "	
....	Judge of Borough Court	Case continued under bonds, child sent to school	Torrington
66	Borough Court	Fine $5.00 and costs	Wallingford
....	City Court	Fine $1.00 and costs	Waterbury

SUMMARY OF TABLE

CAUSE OF PROSECUTION	Parents or Guardian	Children	Employer
Failure to cause child to attend	31		
Truancy		17	
Neglected		15	
Illegal Employment			1

Teachers

Summary of Statistics, 1897-8

Number of teachers in winter, — male, 385; female, 3,556; total	3,941
Increase, male, 3; increase, female, 147; total increase	150
Number of teachers in summer, — male, 365; female, 3,584; total	3,949
Increase, male, 20; increase, female, 133; total increase	153
Number of teachers continued in same school	3,692
Increase for the year	186
Number of teachers who never taught before	449
Average wages per month for male teachers	$88.49
Decrease for the year	.33
Average wages per month for female teachers	$43.03
Increase for the year	.33
Number of teachers whose wages was $20 or less per month — male, 13; female, 112; total	125
Number of teachers whose wages was from $20 to $25 per month — male, 30; female, 223; total	253
Number of teachers who had attended some normal school	1,415
Number of teachers' meetings held during the year	50
Number of state certificates granted	154
Number of state certificates renewed	454
Number of state certificates in force	608

TABLE XXXVI

Report of	No. of Teachers Winter		No. of Teachers Summer		Continuously Employed	Beginners	Av. Wages		Amount paid for teachers' salaries	Per cent. of total expense of schools	Teachers' meetings	Examinations		
	Male	Female	Male	Female			Male	Female				No. held	No. candidates	No. certificates
1866	655	1,448	113	1,959	1,074	558	49.00	22.61	421,137.92	70.4	0	....	....	....
1867	624	1,518	115	1,995	1,185	639	45.21	23.14	482,677.50	67.3	9	....	....	....
1868	617	1,560	139	2,023	1,218	637	52.05	24.91	557,193.22	57.8	12	....	....	....
1869	645	1,580	150	2,057	1,453	651	56.64	26.93	609,658.05	51.3	33	....	....	....
1870	679	1,639	162	2,134	1,568	608	58.74	29.16	695,539.25	54.3	12	....	....	...
1871	702	1,670	185	2,141	1,407	607	63.10	31.29	785,680.04	48.4	9	....	....	...
1872	699	1,721	186	2,194	1,434	595	66.56	32.69	833,759.96	55.6	6	....	....	....
1873	715	1,762	198	2,240	1,508	580	67.01	34.09	888,871.89	58.1	10	....	....	....
1874	711	1,810	246	2,246	1,574	618	69.03	36.05	959,229.40	64.9	11	....	....	....
1875	704	1,897	258	2,303	1,690	539	71.48	36.67	1,021,714.07	60.1	1	....	....	....
1876	721	1,910	272	2,324	1,768	557	70.05	37.35	1,057,242.19	67.1	0	....	....	....
1877	767	1,899	321	2,317	1,780	539	67.43	37.16	1,085,200.05	70.9	6	....	....	....
1878	753	1,923	305	2,354	1,904	478	64.55	36.20	1,058,682.28	60.1	5	....	....	....
1879	752	1,959	349	2,329	1,947	470	61.03	36.50	1,041,040.43	68.1	5	....	....	....
1880	773	1,968	377	2,344	2,063	484	57.19	35.27	1,015,882.91	73.7	5	....	....	....
1881	746	2,025	392	2,354	2,119	411	56.43	35.42	1,011,729.94	71.8	4	....	...	....
1882	680	2,120	349	2,432	2,144	454	60.69	35.37	1,025,322.66	69.4	10	....	....	....
1883	617	2,213	316	2,503	2,183	470	63.44	35.94	1,056,268.25	68.0	9	....	....	....
1884	566	2,301	307	2,532	2,325	460	67.36	36.52	1,094,580.61	60.3	9	...	....	....
1885	562	2,347	307	2,596	2,347	485	69.17	37.21	1,130,863.35	63.6	17	15	153	23
1866	546	2,442	346	2,625	2,463	395	69.16	37.64	1,166,879.13	62.9	23	25	253	47
1887	561	2,477	346	2,670	2,482	419	69.89	37.97	1,188,056.04	66.3	15	20	166	42
1888	533	2,559	343	2,730	2,654	378	68.82	38.50	1,227,412.60	69.4	21	25	296	66
1889	493	2,629	327	2,783	2,677	398	73.50	38.52	1,264,061.02	69.6	6	19	194	33
1890	468	2,631	331	2,785	2,719	378	74.47	39.31	1,291,472.88	65.0	13	23	347	52
1891	460	2,766	356	2,852	2,766	426	76.24	39.34	1,330,087.56	62.2	13	24	283	36
1892	434	2,866	341	2,952	2,866	405	77.11	39.84	1,369,432.97	63.1	13	73	191	151
1893	419	2,925	315	3,023	2,974	405	83.69	39.48	1,426,711.16	63.8	25	73	221	124
1894	390	3,025	321	3,089	3,059	388	86.48	40.64	1,485,377.23	63.4	24	84	250	106
1895	405	3,093	332	3,163	3,171	413	85.87	41.48	1,548,377.23	58.5	28	51	185	117
1896	403	3,228	353	3,283	3,305	365	85.58	41.88	1,621,183.73	62.7	14	76	313	148
1897	409	3,299	361	3,361	3,358	399	84.65	42.34	1,701,659.99	60.8	12	40	396	151
1898	382	3,409	345	3,451	3,506	464	88.77	42.70	1,786,379.71	60.3	53	40	390	171
1899	385	3,556	365	3,584	3,692	449	88.49	43.03	1,850,210.72	61.9	40	25	410	154

Supervision

The following towns or districts have superintendents who devote all their time to the usual duties of supervision:

	Name of Superintendent
Ansonia	W. A. Smith
Bridgeport	C. W. Deane
Danbury (Center District)	G. D. Northrop
Meriden	A. B. Mather
Naugatuck	Andrew D. Meloy
New Britain	G. A. Stuart
New Haven	C. N. Kendall
New London	C. B. Jennings
Norwich (Central District)	N. L. Bishop
Stamford	E. C. Willard
West Hartford	W. H. Hall
Waterbury (City District)	B. W. Tinker

II

The following towns or districts employ supervising principals, who, in most cases, combine teaching with supervision:

Derby	John W. Peck
Hartford	J. A. Graves
"	C. L. Ames
"	W. I. Twitchell
"	W. F. Gordy
"	Esther C. Perry
Killingly (Danielson)	A. P. Somes
Milford	H. I. Mathewson
Norwich (West Chelsea District)	J. B. Stanton
Torrington	E. H. Forbes
Wallingford	Malcolm Booth

III

The following acting visitors unite with supervising some other business or profession:

Bristol	C. L. Wooding
Hartford	Herbert S. Bullard

Teachers' Meetings

The following table shows the number of teachers' meetings held in the state from September 1, 1897, to September 1, 1898:

TABLE XXXVII

Date 1897	Town	Teachers	School Officers	Attendance
Sept. 15	Burlington	11	2	25
17	Norfolk	20	3	33
18	North Stonington, Milltown	30	10	80
19	Danbury	90	3	100
20	New Hartford	..	..	..
21	Morris	..	..	..
22	Kent	..	..	..
23	Madison	..	..	..
24	Vernon, Rockville	..	..	..
27	Greenwich	95	1	100
29	Roxbury	10	2	33
30	Somers	12	1	58
Oct. 1	New Milford	34	5	49
7	Putnam	56	4	80
8	New London	128	11	152
9	Litchfield	24	2	30
11	Glastonbury	22	4	51
13	Sharon	21	3	99
Nov. 4	Old Lyme	28	3	43
6	Windham, Willimantic	..	..	..
12	Southbury, South Britain	23	7	80
18	Canaan, Falls Village	..	..	..
Dec. 4	Windham, Willimantic	..	..	..
1898				
Jan. 8	Windham, Willimantic	..	..	..
14	Mansfield, Spring Hill	8	6	17
29	Danbury	74	2	78
Feb. 5	Windham, Willimantic	..	..	..
Mch. 9	New Fairfield	..	..	..
11	Salisbury	..	..	..

In the following towns there were meetings differing from Table xxxvii in that there was a single instructor or speaker, and the call for the meeting was generally limited to a single town :

TABLE XXXVIII

Sept.	25	Canton	Jan.	31	Glastonbury
	28	Wilton	Feb.	4	Madison
	28	Columbia		7	Vernon, Rockville
	29	Watertown		14	Vernon, Rockville
Oct.	29	New Milford		28	Burlington
Nov.	5	Manchester	Mch.	4	Madison
	5	West Hartford		11	Killingly, Danielson
Dec.	10	New Milford		14	Vernon, Rockville
1898			April	1	Thompson, No. Grosvenordale
Jan.	11	Killingly, Danielson		23	Southington
	15	Hartford	May	3	Glastonbury
	17	Norwich			
	28	North Stonington, Milltown			
	28	New Milford			

State Examinations

The record covers the period from September 1, 1897, to September 1, 1898:

Number of different candidates	410
Number of examination papers	1,877
Number of preliminary papers	691
Number of certificates granted	154
Number of certificates renewed	454
Number of certificates in force —	
Elementary	593
Honor	15
Total	608

Elementary Certificates

The following were holders of elementary certificates September 1, 1898:

Abetz, Etta M., Unionville
Adams, Dorothy R, Westport
Ahern, Margaret G., Portland
Allen, Carrie S., Brooklyn, N. Y.
Anderson, Mary F., Hartford
Andrews, Mary E., Waterville
Armstrong, Isabella, Stonington
Atkins, Grace E., Forestville
Augur, Elma, Westville
Ayer, Mary L., Norwich
Ayers, Mary C., Bridgeport
Babcock, Lauretta H., Branford
Babcock, Sadie L., Stonington
Bacon, Jennie V., Wethersfield
Bacon, Mary C., Scotland
Bailey, J. Adanois, Milford
Baldwin, Adella F, Woodbridge
Baldwin, Anna J., New Haven
Baldwin, Mary S., Milford
Ballard, Laura C., Thompson
Balzer, Lottie B., New Haven
Bancroft, Bertha L., New Britain
Barber, Lucretia J., West Torrington
Barber, Mary E., West Torrington
Barber, M Jessie, Hartford
Barbour, Grace M., Collinsville
Barchfeld, Helen M., Hartford
Barclay, Helen M., Kent
Barnum, Agnes C., Gaylordsville
Barrows, Fannie S., Stonington
Bartlett, Edith F., Broad Brook
Bartliff, Emma F., South Manchester
Bass, Egbert A., Andover
Bass, Harriet M., Scotland
Bassford, Minnie, Ansonia
Beard, Flora, Bellville, N. J.
Beard, Nellie S., Milford
Beaujon, Charles A., North Canaan
Beebe, Lina H., East Hampton
Berg, Mary K., South Norwalk
Bidwell, Ida L., Middletown
Bigelow, Bessie I., New Britain
Birsey, Lucy E., West Haven
Birtles, Rosa E., New Britain
Bishop, Jessie R., Cheshire
Black, B. Lavinia, Hartford
Black, Harriet F., Hartford
Blackwell, Effie D., Bloomfield
Blaisdell, Edna S., Willimantic
Blake, Mary J., Hartford
Blakeslee, Edith E., New Haven
Bliss, Frances M., Oneco
Boardman, Albert, Taftville
Boardman, Alice E., Taftville
Bonney, Jennie G., Norwich Town
Booth, Grace, New Haven
Botelle, Myrtie L., Cromwell
Bowen, Jennie C., New Haven
Bowers, Bertha N., West Haven
Boyle, Katherine L., West Haven
Boynton, Sarah I., South Coventry
Bradford, Harriet B., Brooklyn
Bradley, Grace A., Hartford
Bradley, Lizzie H., Stonington
Brennan, Elizabeth A., New Haven
Brierly, Grace E., Willimantic
Britner, Annie, Willimantic
Britton, Annie C., Willimantic
Brock, Nellie S., Plainville
Brockett, Clara A., New Haven
Brown, E. Ine, Wallingford
Brown, Ella M., Merrow
Brown, Harriet E., Yalesville
Brown, Hattie B., Gale's Ferry
Brown, Julia, Greenfield Hill
Browne, Katherine L., Willimantic
Brown, Laura S., Waterbury
Brown, Mattie L., Talcottville

Brownlee, Ida, South Willington
Bubser, Anna A., Hartford
Buckley, Julia V., Branford
Bull, Adelia F., Ivoryton
Bunnell, Julia A., Bristol
Burke, Katharine R.,
Holyoke, Mass
Bushnell, J. Clement,
Norwich Town
Butler, Frances A.,
Springfield, Mass
Butler, Grace R., Seymour
Cadwell, George A., Taftville
Cahill, Ella M., Milton
Callan, Lucy L., Southport
Callahan, Kathryn, New Haven
Callahan, Margaret, Branford
Camp, Susan A., Hawleyville
Campbell, Annie N., New London
Campbell, Jennie M., New Haven
Campbell, Sarah G., Westport
Carpenter, Bertha, Moosup
Case, Edward R., Norwich Town
Casey, Nellie, Meriden
Cashman, Catherine R., Kensington
Cavanaugh, Annie A., Norwalk
Cavanaugh, Teresa R., Norwalk
Champlin, Lottie M., Hartford
Chapin, Gertrude L., New Britain
Chapman, Jessie E., Portland
Chapman, Lucy E., Old Mystic
Clarke, Isabel S., Higganum
Clarke, Leone G., Willimantic
Clarke, Minnie L., New Britain
Clark, Sophie D., Simsbury
Clark, Teresa B., Stafford Springs
Cobb, Edna J., Windsor
Cobey, Susie R., Beckley
Cody, Nellie T., Hartford
Coe, Emma M., Waterville
Coe, Susie C., New Haven
Colburn, E. Gertrude,
South Coventry
Conboy, M. Elizabeth, New Haven
Condell, M. Catherine, New Haven
Connor, Ella C., Broad Brook
Connor, Margaret G.,
Holyoke, Mass.
Connor, Mary F., Hartford
Conway, Catherine M., New Haven
Cooke, Grace A., Thomaston
Cooley, Amy C., Hartford
Cope, Catherine P., Thompsonville
Cope, Grace M., Thompsonville
Cornelius, Isabella C., Cromwell
Courtney, Margaret T.,
Willimantic
Covert, Grace R., Branford
Coxeter, Nellie, New Haven
Crampton, Ruth S., Hartford
Crocker, Esther F., New Haven
Cross, L. Howard,
Mansfield Center
Crowell, Lottie A., Middletown
Cummings, Rose A., Hartford
Curtiss, Miriam B., Bristol
Daley, Celia M., Moosup
Daniels, Inez A , Uxbridge, Mass
Day, Lena L., Lakeville
Day, Rose E., Lakeville
DeBank, Clarissa, Ansonia
Deming, Edyth M., New Britain
Dibble, Margaret L., Saybrook
Dickey, Alice E., Norwich Town
Dillon, Marie R., New Haven
Dodge, Amy B., East Norwalk
Donahue, Julia M., Litchfield
Donaldson, Minnie R., Winsted
Doolittle, Ruth M., New Britain
Doran, Agnes G., Shelton
Dougherty, Katherine A.,
Cornwall Bridge
Dowd, Clara M., East River
Downton, Lucy, Thompsonville
Doyle, Elizabeth B., New Haven
Doyle, Mae E., Enfield
Doyle, Marie, New Haven
Dunbar, Jennie, New Britain
Dunn, Margaret M., New Haven
Durfey, Lucy G., Norwich
Dwight, M. Grace, Stafford Springs
Dwyer, Lillian V., New Haven
Dyson, Helen E., Thompsonville
Egan, Margaret A., Parkville
Eldredge, Jennie W., Old Mystic
Ellis, Mary I., Hartford
Falvey, Agnes E., Meriden
Farrell, Lillian A., Norwalk
Fernquist, Hilma C., North Canton
Ferriss, Minnie A., New Milford
Field, Fannie E., New Haven
Filer, Emma R., Warehouse Point
Finnegan, Mary A., New Britain
Fisk, Mary E., Stafford
Fitzpatrick, Mary A., Ansonia
Flint, Georgiana, Willimantic
Flynn, Elizabeth I., West Norfolk
Flynn, Jane C., Hartford
Foley, Helen C., Hartford
Foote, Alice P., Bristol
Ford, Alice S., Meriden
Francis, Julia A., Southport
Frawley, Bertha C., Thompson
Fuller, Alice M., Hampton
Gaffney, Mary A. J., Burlington
Gallagher, Maggie V., Farmington
Gallup, Bessie M., Hartford
Galvin, Margaret R., Hartford
Gard, Edith A., New London
Gay, Laura E., Lime Rock
Geer, Maria E., East Norwalk
Gessner, Elizabeth E., New Haven
Gilchreest, Alice I., New Britain
Gillen, Mary A., New Haven
Gilligan, Jennie T., Kensington
Gilhooly, Katherine, Wallingford
Gillmore, Edyth A., Broad Brook
Gilshenan, Mary A., Middletown

Golding, Ada H., Norwalk
Golding, Carolyn A., Norwalk
Gorham, Ella L., West Haven
Gorham, Eva A., Westville
Gorman, Mary C., New Britain
Gould, Jeanette E., Portland
Graeber, Antoine D., Meriden
Gray, Jessie M., New Britain
Gray, Maude A., South Manchester
Gridley, Edith M., Southington
Griffin, Sarah L , West Suffield
Griswold, Jessie D., Rocky Hill
Hackett, Katherine A., Bristol
Hall, Eda L., New Canaan
Hall, Phila H., Westford, Vt.
Hamilton, Georgia B , Danbury
Hamilton, Howard L.,
Windsorville
Hamlin, Mary W., Willimantic
Hanna, Grace L., Montville
Hanna, Leonora S., New Britain
Hansen, A. Marie, Hartford
Harris, Edna M., Meriden
Harris, Elfie L., Norwich
Harrison, Gertrude C.,
West Cornwall
Harty, Katherine T., New Haven
Hathaway, E Marion, Willimantic
Hayes, Lizzie T., Jewett City
Hayes, Mary J., Ansonia
Healey, Alice M., West Hartford
Heilman, Honor C., New Haven
Helgren, Louise O., Hartford
Helion, Margaret T., Hartford
Henderson, Annie H., Thomaston
Henderson, Barbara, New Haven
Herring, Jessie M., Stratford
Hickox, Calla C., Durham
Hickox, Eva A., Durham
Higgins, Hanna M., Branford
Hills, Bertha M., Hillstown
Hintz, Anna, New Haven
Hogan, Elizabeth H., Unionville
Holcomb, Elizabeth A.,
East Granby
Holcomb, Fanny, New Haven
Holcomb, Ida G., Simsbury
Holmes, Marianne E.,
New London
Honan, Mary A , Gaylordsville
Hooper, Grace, Montville
Hopkins, Callie E., Plainfield
Hopton, Lillian M., New Haven
Hotchkiss, Lottie H., New Haven
Hoye, Anna A., New Haven
Hubbell, Carrie B., Stratford
Hubbell, Estella F., Ansonia
Hubbell, Harriet M., New Haven
Huested, Florence E., Stamford
Hull, Anna M., Branford
Hull, Emma L., Jewett City
Hull, Mary A., Ansonia
Huntting, Janet S., Hartford
Huntting, Ella, Deep River
Hurley, Margaret M., Shelton
Hussion, Agnes E., New Haven
Hyde, Fannie S., Danbury
Hyde, Ida S., New Haven
Igoe, Mary R., New Haven
Innis, Eva L., Stratford
Ives, Rosa J., Old Lyme
Jack, Katherine, Norwich
Jackson, Jane, Willimantic
Jacobi, Margaret, Falls Village
Jacobs, Hattie A., Willimantic
James, Alice E , North Windham
Jennings, M. Winifred,
Greenfield Hill
Johnson, Emma A., Winsted
Johnson, M. Josephine,
New Haven
Johnson, Sallie M., East Morris
Jones, Inez D., North Westchester
Jordan, Mary S., Willimantic
Joyner, Rachel E., Hartford
Judson, Ada B., New Haven
June, Emma P. A., New Britain
Kahrman, Nettie E , Higganum
Kane, Loretta M., Bristol
Keefe, Helen N., New Haven
Kegwin, Ida M., Colchester
Keith, Marie C., Norwalk
Keleher, Mary L., Westerly, R. I.
Kelleher, Josephine A., Stanwich
Kelly, Emily W., Waterbury
Kelley, Josephine F.,
Windsor Locks
Kelley, Marcella M.,
Norwich Town
Kelley, Mary M., Norwich Town
Kemp, Sarah E., New Haven
Kenney, Winifred K., Hartford
King, Frank S., Putnam
Kingsbury, Myrtice, Thompson
Kiniry, Nora R., New Britain
Kinlock, Mary E., New Britain
Kinsman, Louise H., Hartford
Klebe, Clara A., New Haven
Kloppenberg, Eleanor, Norwich
Kyle, Annie D., Bethel
Lake, Grace E., Newtown
Lane, Edgar H., Killingworth
Lathrop, Gladys L., Willimantic
Laurie, Annie I., Middletown
Laurie, Mabel E., Middletown
Lawler, Mary K., Windsor Locks
Lawton, Caroline L ,West Cheshire
Leavey, Kate E., Allston, Mass.
Lee, Mary A., Willimantic
Leghorn, Elizabeth Z.,
New Britain
Lennon, Lulu A., New Haven
Lewis, Almira, Middletown
Lewis, Mary R., Portland
Lillis, Ella, Sandy Hook
Little, Cora P., Southington
Livingstone, Alice M., Taftville
Logan, Elizabeth C., New Haven

Loudon, Florence, Norwalk
Lowe, Anna F., New Haven
Lowe, Florence L., New Haven
Luke, Ella, Milford
Lyman, Mary F.,
Somerville, Mass.
Lynch, Elizabeth G.,
Norwich Town
Lynch, May A., Meriden
Mackrille, Edith E., West Haven
Macphie, Ida K., New Haven
Magill, Anna J., New Britain
Maher, Florence B., Thompsonville
Malloy, Genevieve, Meriden
Manion, Nellie A., Windsor Locks
Manley, Anna, Danbury
Marsden, Susette S., Meriden
Marsh, Edena L., Hartford
Martin, Helen T., Ansonia
Martin, Julia L., Chaplin
Martin, Susie M., Thomaston
Marvin, Lillie A., Colchester
Mason, Edna B., Mansfield
Mather, Marcia B., Deep River
Maynard, Evelyn L., New Haven
McCann, Catherine E., Saugatuck
McClellan, John W.,
Norwich Town
McClimon, Annie M., Preston
McConville, Lillian M.,
New Haven
McCormick, Christine, New Haven
McEvoy, Norah J., Hartford
McGarth, Elizabeth C., Mystic
McGrail, Ella T., Branford
McGue, Augusta H.,
South Norwalk
McGuire, Annie E., New Haven
McHugh, Helena, Holyoke, Mass.
McHugh, Katherine A.,
New Haven
McLaughlin, Mary L., Norwich
McMahon, May M., Ansonia
McMillan, Elizabeth W., Norwich
McNamara, Lizzie I ,
Westerly, R. I.
McNulty, Annie E., New Britain
Meehan, Margaret J., New Britain
Merchant, Kittie, New Haven
Merwin, M. Adella,
Cornwall Hollow
Miller, Grace E., Middlefield
Miller, Hattie D., Bloomfield
Miller, Leonora E., Norwich Town
Miller, Sarah B , Middlefield
Minor, Alice, New Haven
Miskill, Adelaide M., Broad Brook
Mitchell, May, Norwich
Moakley, Mary M., New Haven
Moore, Bessie A., Westbrook
Moore, Mary A., West Haven
Morgan, Clara L., Sound Beach
Moriarty, Ellen A., Hartford
Moriarty, Rose A., New Haven
Morrison, Margaret E., Bethel
Morrison, Martha A., Bethel
Mortimer, Anna M. Gadbois,
Moosup
Mulcahy, Bridget T., Hartford
Mulcahy, Julia A., West Winsted
Murnane, Anna J., New Britain
Murphy, Agnes G., Middletown
Murphy, Katherine T., Stamford
Murphy, Margaret A., New Haven
Murphy, Susan T., Willimantic
Murray, Alice E.,
South Manchester
Murray, Mary L., Willimantic
Myers, Eva B., Bethel
Nash, Julia E., West Haven
Nelson, Mary E., Willimantic
Nettleton, Orrie E., Bristol
Newell, Edna A., South Coventry
Newell, Susan T., West Haven
Newman, Agnes C., New Haven
Newman, Louise B.,
Norwich Town
Newton, Catherine L., Middletown
Newton, Rosilla R., Hartford
Ney, Elsie L., Hartford
Nicholas, Josephine S., Ridgefield
Nihill, Minnie A., New Britain
Noonan, Ella M., Stonington
Northrop, Edith, Berlin
Norton, Edith S., Willimantic
Norton, Hannah, Willimantic
Norton, Marion E., Wallingford
Norton, Rebecca E., Torrington
Norton, S. Annie, Wallingford
Noyes, Edgar W.,
Warehouse Point
Noyes, Lena B., Liberty Hill
Oddie, Florence M., Taftville
Olmstead, Ruth, New Haven
O'Neil, Frances T., Willimantic
Osgood, Harriett M., New Haven
Palmer, Sarah T., Pendleton Hill
Park, Villa M., Preston
Parsons, Agnes D., New Britain
Pausch, Clara A., Hartford
Pausch, Emily F., Hartford
Peck, Maria D., Westchester
Pegrum, Minnie T., Watertown
Perkins, Annie L., Willimantic
Pilling, Mary E., Danbury
Pinney, Margaret F., Bloomfield
Planten, Anna S , New Haven
Planten, Emma M., New Haven
Porter, Edith M., Willimantic
Potter, Dora E., Willimantic
Pratt, Gilbert F., Pomfret
Prince, Frances A., New Haven
Prindle, Eva M., Sharon
Prochnow, Charlotte S.,
Port Chester, N. Y.
Purdue, Janet M., New Haven
Purinton, E. Maude, Hartford
Quigg, Mary B., New Canaan

Quilter, Rose I., New Hartford
Quinlan, Eleanor T., Branford
Quinlan, Martha A., Branford
Quinn, Anna A., Hartford
Randall, Mary A., Lebanon
Rathbun, Bessie M., Noank
Reilly, Catherine B., Derby
Remington, Clara E., Willimantic
Rentz, Lulu, West Haven
Rice, Winifred E., Westford, Vt.
Ring, Hannah H., Norwich
Ritchie, Maud F., Montville
Robbins, Bertha T., Wethersfield
Robbins, Martha M., Branford
Roberts, Grace M., West Suffield
Robertson, George H., Ridgefield
Robinson, Annie M., Colchester
Rochfort, Mabel E., New Haven
Rood, Elsie A., Hartford
Roots, Ruth M., Morris
Roraback, Grace M., Canaan
Rose, Eleanor, Norwich
Rose, Elizabeth F., Taftville
Rowley, Emma R., Windsorville
Russell, Claude C., East Hartford
Ryan, Caroline A., Meriden
Ryan, Mary C., Hartford
Sanford, Alice M., New Haven
Satterlee, Amy B., Gale's Ferry
Savage, Julia S., Ivoryton
Scanlon, Eliza L., Branford
Schmahl, Catherine, New Haven
Schmahl, Louise, New Haven
Schwarz, Lena M., Fairfield
Scofield, Mabel M., New Haven
Scoville, Alice D., Chestnut Hill
Scranton, Alice L., Wallingford
Seery, Margaret E., New Haven
Service, Isabella T., Norwich
Service, Mary J., Norwich
Setchell, Harriet K., New Haven
Seymour, Daisy P., Meriden
Shader, Bertha, Meriden
Shaw, Martha I., Meriden
Shea, Mary A., Guilford
Sheehan, Elizabeth G.,
New Haven
Sheldon, Marion A., New Britain
Sherwood, Annie T.,
Green's Farms
Simms, Carrie I., Windsor Locks
Simonson, Jessie, New Britain
Smith, Edith V., West Haven
Smith, Ellen C., West Haven
Smith, Minnie M., New Haven
Smith, M. Louise, Saugatuck
Smith, Susan S., Norwalk
Smith, William E , Norwalk
Spaulding, Emma E.,
East Norwalk
Spencer, Florence M., Hartford
Spencer, Sara E., Guilford
Spitz, Rose, New London
Sporer, Margaretha, Hartford
Squires, Annetta C., West Haven
Stannard, Floy E., Winsted
Starrs, Cecilia A., New Haven
Steele, Alice, Portland
Steele, Ellen, Portland
Steele, Julia M., Ansonia
Steirtz, Elisa M., Meriden
Stevens, Lucy M., Stamford
Steves, N. Maude, Ansonia
Stillman, Clara M., Rocky Hill
St. John, Delia E., Norwich
Stone, Grace G., Norwich
Stone, Mabel E., Hartford
Storrs, Mabel N., Hartford
Stoughton, Ellen K., East Hartford
Street, Daisy M., Rockville
Strong, Jennie D., Manchester
Sugrue, Agnes C., Willimantic
Sullivan, Bridget A., Willimantic
Sullivan, Cecilia M., Plymouth
Sullivan, Helena J., Bridgeport
Sullivan, Josephine H.,
New Haven
Sullivan, Margaret E., Stamford
Sullivan, Nona A., Ansonia
Sutliff, Daisy B., New Britain
Suydam, Gertrude L , Salisbury
Tanyane, Annie M., New Haven
Tarbox, William G., Montville
Tatem, F. May, Hartford
Terrill, Hattie E., Ansonia
Tetlow, Edith, Westerly, R. I.
Thomas, Augusta M., Willimantic
Thompson, Mary K., Willimantic
Thornberry, Alice B., New Haven
Tiffany, Helen P., Ansonia
Tobin, Anna S., Windsor Locks
Toohy, Dorothy, Manchester
Torrance, Jennie M., Norwich
Townson, Sarah A., Thompsonville
Tracy, Coral E , Willimantic
Tracy, Kathryn M., Bristol
Trickey, Lola M , Danielson
Tripp, Annie I , Central Village
Trowbridge, Clara B., Stamford
Tucker, Mary F., New Haven
Tuite, Mary E., Hartford
Turner, Edith L., Wallingford
Turner, Rose L., Norwich
Tyler, Elma M., Deep River
Verplanck, Frederick A.,
South Manchester
Viets, Georgie B., East Granby
Wakelee, Harriet B., Derby
Wallace, Maisie E., Branford
Walsh, Ella C , Ansonia
Walsh, Mary A., Naugatuck
Warner, Ella P., Highwood
Warner, S. Elizabeth, Stamford
Washburn, Ella A.,
Housatonic, Mass.
Webb, Carrie A., Waterbury
Welles, Florence C., Wethersfield
Welles, Katherine, Wethersfield

Wells, Harriet F., New Britain
Welton, Alice A., New Haven
Weeks, William M., Easton
Wheeler, Jennie R., New Britain
Wheeler, Kathleen, Broad Brook
Wheeler, Minnie A., Norwich
Wheeler, Susie J., Naugatuck
White, Fannie H., South Coventry
White, Margaret E., Hartford
Whitney, Estelle N., Middletown
Whitney, Jennie M., Southington
Wilcox, Amelia L., Norwalk
Wilcox, Annabelle, Ponsett
Wilcox, Clara L., New Haven
Wilcox, Katherine, New London
Wilcox, Lina D., Middletown
Wilkinson, Sarah M., Shelton
Willard, Martha, Wethersfield
Willey, Jessie A., Norwich
Williams, Ida J., Moodus
Williams, Mary A., Willimantic
Williams, Mary A., New Haven
Williams, Rena B., Silver Lane
Wilson, Edna E., Norwalk
Winslow, Emma E., Hartford
Witter, Nellie B., Hanover
Woisard, Anita R., Norwich
Wolfe, Maud E., Stratford
Wood, Jennie D., Meriden
Wood, Mary A., Waterbury
Wood, Winifred A., Waterbury
Woodbury, Louise, Springdale
Wooding, Mary E., Hartford
Woodward, Alice M., North Stonington
Woodward, Jessie C., Vernon Center
Woodworth, Elizabeth, Hartford
Wright, Julia H., Phelps, N. Y.
Wright, Sarah E., New Haven
Wrigley, Eda, Shelton

HONOR CERTIFICATES

Ayres, Mary C., Bridgeport
Barber, Lucretia J., West Torrington
Blake, Mary J., Hartford
Bubser, Anna A., Hartford
Clark, Minnie L., New Britain
Golding, Ada H., Norwalk
Guinan, Mary E., Hartford
Hanna, Leonora S., New Britain
McArdle, Mary H., New Britain
Moriarty, Rose A., New Haven
McNulty, Annie E., New Britain
Sheldon, Marian A., New Britain
Simonson, Jessie, New Britain
Verplanck, Frederick A., South Manchester
Weeks, William M., Easton

Total, 608.

SCHOOLS

Summary of Statistics 1897–8

Number of towns in the state	168
Number of districts in the state	1,127
Number of public schools	1,547
Decrease for the year	7
Number of departments in public schools	3,628
Increase for the year	117
Average length of public schools	188.82 days
Increase for the year	37
Number of schools of two departments	135
Number of schools of three departments	57
Number of schools of four departments	60
Number of schools of five departments	15
Number of schools of six or more departments	170
Number of towns having high schools	64
Number of high schools	77
Whole number of graded schools	437
Number of evening schools	21
Number of Normal schools	3
Number of public kindergartens	63

The greatest advance in school administration is in the length of time the schools are open. The following table shows the advance in eleven years:

TABLE XXXIX

Report of	Length in days	Report of	Length in days
1888	180.18	1894	182.74
1889	170.08	1895	182.92
1890	180.32	1896	183.32
1891	182.51	1897	187.47
1892	182.26	1898	187.45
1893	182.30	1899	188.82

The increase in the number of schools [departments] in the last eight years is as follows:

TABLE XL

Report of	No. of Schools	Report of	No. of Schools
1892	3,057	1896	3,338
1893	3,131	1897	3,436
1894	3,171	1898	3,511
1895	3,236	1899	3,628

Below will be found a summary for years 1866 to 1899 inclusive:

TABLE XLI

Report of	Average Length	No Districts	No Public Schools	No. of Departments	No. of Graded Schools	Evening Schools
1866	175.00	1,623	1,662	1,991	186	..
1867	164.50	1,609	1,651	2,051	187	..
1868	164.50	1,590	1,645	2,066	189	..
1869	163.05	1,572	1,640	2,140	203	..
1870	161.75	1,570	1,647	2,213	217	..
1871	168.51	1,555	1,644	2,248	217	..
1872	172.41	1,535	1,630	2,290	225	..
1873	173.34	1,521	1,638	2,348	232	..
1874	174.18	1,502	1,648	2,405	236	..
1875	176.29	1,495	1,642	2,458	260	..
1876	176.26	1,506	1,650	2,499	264	..
1877	178.14	1,493	1,628	2,499	270	..
1878	177.52	1,487	1,629	2,530	277	..
1879	178.47	1,500	1,647	2,564	286	..
1880	178 60	1,498	1,638	2,571	300	..
1881	179.02	1,473	1,630	2,594	308	..
1882	179.98	1,471	1,634	2,627	314	..
1883	179.66	1,447	1,628	2,649	313	..
1884	178.77	1,447	1,634	2,735	320	26
1885	179.55	1,447	1,639	2,779	338	23
1886	179.18	1,441	1,633	2,837	339	29
1887	179.74	1,447	1,631	2,860	354	31
1888	180.18	1,424	1,628	2,903	361	26
1889	179.08	1,423	1,624	2,921	361	33
1890	180.32	1,404	1,629	2,969	362	30
1891	182.51	1,394	1,611	2,994	362	27
1892	182.26	1,408	1,599	3,057	379	35
1893	182.30	1,394	1,594	3,131	379	39
1894	182.74	1,386	1,584	3,171	376	24
1895	182.92	1,347	1,561	3,236	385	43
1896	183.32	1,263	1,577	3,338	395	35
1897	187.47	1,261	1,563	3,436	411	31
1898	187.45	1,210	1,554	3,511	425	26
1899	188.82	1,127	1,547	3,628	437	21

Normal Schools

ATTENDANCE

The number of students in attendance at the normal schools in the year 1897–8 was as follows:

New Britain	200
Willimantic	124
New Haven	181
	505

The number in attendance in the several years beginning with the school year 1889–90 was:

	1889	1890	1891	1892	1893	1894	1895	1896	1897
New Britain	265	300	335	328	191	194	236	211	200
Willimantic	27	70	79	67	76	69	87	119	124
New Haven	..	..	..	..	98	209	200	173	181
	292	370	414	395	365	472	523	503	505

The number in attendance at the beginning of the school year 1898–9 was:

New Britain	231
Willimantic	121
New Haven	182
	535

ENTERING CLASSES

The entering classes in the fall of 1898 were:

New Britain	151
Willimantic	64
New Haven	110
	325

The entering classes in the years since 1889 were as follows:

	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
New Britain	128	150	205	193	122	108	148	123	104	151
Willimantic	27	43	41	46	41	37	41	77	58	64
New Haven	..	..	..	..	98	133	124	109	119	110
	155	193	246	239	261	278	313	309	281	325

GRADUATES

The number of graduates in 1898 was as follows:

New Britain	74
Willimantic	45
New Haven	55
	174

The number graduated in all the years since 1889 is as follows:

	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
New Britain	80	72	66	91	87	74	70	55	63	74
Willimantic	..	..	22	26	18	26	23	26	33	45
New Haven	..	..	..	..	..	..	52	66	58	55
	80	72	88	117	105	100	145	147	154	174

The education of those entering in the years 1889–98 has been as follows:

TABLE XLII

	New Britain					Willimantic					New Haven					Total
	High School				Common School	High School				Common School	High School				Common School	
	4 Years	3 Years	2 Years	1 Year		4 Years	3 Years	2 Years	1 Year		4 Years	3 Years	2 Years	1 Year		
1889....	32	2	11	9	50	5	1	2	4	15	....	....	....	....	....	131
1890....	31	17	18	20	86	8	2	2	2	28	....	....	....	....	....	214
1891....	35	8	14	18	79	4	2	5	2	26	....	....	....	....	....	193
1892....	28	17	21	21	71	5	2	5	3	31	....	....	....	....	....	204
1893....	31	11	15	7	58	11	1	6	3	20	59	7	10	8	14	261
1894....	26	11	18	10	43	12	3	2	5	15	64	15	16	10	28	278
1895....	51	14	20	14	46	17	2	0	4	18	64	9	15	9	27	313
1896....	67	11	13	11	21	40	4	8	4	21	46	15	14	5	22	309
1897....	67	5	13	5	14	27	5	7	2	17	52	23	9	10	15	*281
1898....	90	72	18	10	11	22	10	2	5	9	70	1	7	6	25	325

The following table shows the towns from which students have entered the normal school in the years 1883–98 inclusive, with the number that entered from each town in each year:

TABLE XLIII

	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
HARTFORD CO.																
Hartford	7	17	12	15	11	12	17	21	25	22	27	16	22	17	24	19
Avon	..	..	..	..	..	1	1	.	..	1	..	..	2	..	..	0
Berlin	2	..	..	..	..	4	2	..	..	..	..	4	2	..	1	1
Bloomfield	1	2	2	..	2	1	2	3	1	..	..	..	..	..	..	0
Bristol	2	..	..	1	5	7	1	..	3	3	4	3	3	4	2	2
Canton	..	..	..	..	..	..	1	1	..	..	1	..	..	..	..	4
East Granby	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	0
East Hartford	..	..	1	3	..	2	5	3	1	3	2	1	3	1	1	2
East Windsor	3	3	1	2	1	4	3	1	..	..	2	1	4	1	.	3
Enfield	4	8	6	2	..	1	1	7	2	1	3	4	7	2	2	2
Farmington	2	..	2	2	..	..	2	6	2	..	1	4	2	1	3	3
Glastonbury	..	1	.	2	1	..	..	1	1	2	..	..	..	..	1	0
Granby	..	2	2	..	..	..	1	..	..	..	..	..	..	..	..	0
Hartland	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	0
Manchester	1	..	4	3	4	3	3	5	5	4	1	1	3	2	4	2
Marlborough	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	0
New Britain	6	8	9	14	16	10	12	20	15	24	24	16	14	19	7	15
Newington	..	5	..	2	1	1	2	2	2	..	2	..	1	..	..	3
Plainville	..	..	..	1	2	..	..	2	..	1	1	..	5	..	1	0
Rocky Hill	..	2	1	1	..	..	..	..	1	2	..	..	..	..	..	1
Simsbury	..	..	..	..	1	..	..	2	..	..	3	1	3	2	2	2
Southington	..	1	..	1	..	1	3	1	1	2	4	3	2	1	4	2
South Windsor	..	1	..	..	3	..	1	3	1	4	..	.	..	..	..	1
Suffield	..	..	..	..	4	1	3	3	..	..	..	..	..	1	..	0
West Hartford	..	..	1	1	..	1	5	3	2	3	..	..	..	1	2	2
Wethersfield	..	3	4	2	1	6	2	2	..	2	2	1	4	2	3	2
Windsor	..	1	1	1	..	..	1	1	1	..	1	..	..	4	1	1
Windsor Locks	..	2	..	6	3	4	3	3	2	3	8	1	3	2	1	0
NEW HAVEN CO.																
New Haven	2	1	3	1	4	3	2	2	2	1	68	61	38	38	40	40
Ansonia	..	..	..	..	..	..	1	1	..	..	4	4	13	3	8	3
Beacon Falls	..	..	..	..	..	..	..	..	..	..	..	.	1	..	..	0
Bethany	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	0
Branford	..	..	..	..	..	..	.	3	1	5	..	2	5	4	..	0
Cheshire	1	2	..	..	..	1	1	4	1	2	1	1	..	..	3	0
Derby	..	..	3	3	2	2	1	3	..	..	1	1	..	..	2	2
East Haven	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	1
Guilford	..	1	..	1	..	..	..	..	..	1	1	3	1	1	1	1
Hamden	..	..	..	..	1	..	..	..	1	2	2	2	..	..	..	0
Madison	..	..	1	2	..	..	..	..	1	2	5	..	4	..	..	0
Meriden	3	3	4	6	11	7	10	7	12	9	6	2	8	13	3	10
Middlebury	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	0
Milford	..	..	1	..	..	1	4	..	1	2	2	3	..	..	2	2
Naugatuck	..	..	..	..	..	..	..	..	1	2	..	..	2	..	..	3
North Branford	..	..	1	..	2	..	..	..	..	2	1	..	1	..	..	1
North Haven	..	1	..	1	1	..	2	..	..	..	..	..	..	..	1	2
Oxford	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1
Orange	1	..	..	..	..	1	..	1	1	1	5	3	4	3	7	10
Prospect	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0
Seymour	..	..	..	..	1	2	1	1	..	..	1	..	..	3	2	0
Southbury	1	1	..	..	..	..	..	..	..	.	..	2	..	..	..	2
Wallingford	2	4	4	3	5	..	2	3	6	7	1	9	2	2	5	3
Waterbury	..	2	4	1	3	6	2	15	4	1	2	3	6	8	4	20
Woodbridge	..	1	..	..	..	..	..	..	..	..	1	..	..	2	1	0
NEW LONDON CO.																
New London	2	2	2	1	..	..	2	1	1	..	1	1	..	3	..	0
Norwich	2	5	1	2	1	2	5	5	3	5	7	6	5	18	7	11
Bozrah	..	..	..	..	..	..	..	1	..	..	..	1	..	..	1	1
Colchester	1	2	1	1	1	..	1	1	2	1	1	1	1	..	3	3
East Lyme	..	..	..	..	..	..	..	..	1	..	1	1	..	1	1	1
Franklin	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	0
Griswold	..	..	2	1	..	..	..	..	1	..	..	..	1	..	..	0
Groton	3	1	..	..	..	..	..	..	1	..	..	..	1	2	..	1
Lebanon	..	1	..	1	..	1	2	2	3	1	1	..	1	5	4	2
Ledyard	..	..	4	..	1	..	..	..	2	1	..	..	..	..	..	0
Lisbon	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Lyme	..	..	2	1	1	..	..	..	..	1	..	..	..	..	..	1
Montville	..	..	..	..	..	..	1	..	2	..	1	1	..	2	1	1
North Stonington	..	..	1	2	1	..	..	..	1	1	..	..	3	2	..	3
Old Lyme	..	..	1	2	..	..	..	..	..	..	..	1	1	..	..	1
Preston	..	..	..	..	..	..	1	..	1	1	1	..	2	3	..	1
Sprague	..	..	..	..	..	2	2	..	..	..	1	1	..	..	1	0
Stonington	..	..	..	1	2	2	..	2	3	3	..	..	1	6	3	5
Waterford	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	0

	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
FAIRFIELD CO.																
Bridgeport	..	..	..	1	3	..	..	..	..	2	..	5	1	2	4	1
Danbury	1	..	..	1	..	..	1	..	2	2	1	..	2	4	..	2
Bethel	..	..	2	..	..	..	..	1	..	2	..	2	2	2	3	1
Brookfield	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1
Darien	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	0
Easton	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Fairfield	..	..	1	..	..	..	..	..	..	1	1	1	2	..	..	1
Greenwich	..	1	1	..	..	..	3	..	..	1	..	..	1	1	..	1
Huntington	..	..	1	..	..	1	..	..	1	1	1	3	2	3	..	1
New Canaan	1	..	..	..	1	..	1	..	..	..	..	..	1	..	..	2
New Fairfield	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0
Newtown	..	1	2	1	..	1	..	1	2	3	..	1	1	1	1	1
Norwalk	1	1	1	4	4	2	3	3	2	5	5	7	11	4	5	8
Redding	..	..	..	3	1	..	1	..	..	..	..	1	..	..	..	0
Ridgefield	..	1	..	1	1	..	1	..	..	..	..	..	..	2	2	0
Sherman	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Stamford	1	2	1	1	1	1	5	2	5	2	9	4	4	2	5	10
Stratford	..	1	1	2	2	1	..	1	1	..	2	5	3	2	3	0
Trumbull	..	..	..	..	..	..	..	3	..	1	..	..	..	..	1	1
Westport	..	..	2	1	..	1	1	..	3	1	1	2	..	2	1	2
Wilton	..	..	..	..	..	..	..	..	..	1	..	..	2	..	..	0
WINDHAM CO.																
Brooklyn	..	..	..	..	..	..	..	..	1	5	..	..	1	1	2	0
Ashford	..	..	..	..	..	..	..	1	1	1	1	2	..	..	..	0
Canterbury	..	..	1	1	..	1	1	1	1	..	..	..	3	..	..	0
Chaplin	..	..	..	..	..	2	..	1	..	..	..	..	2	1	..	0
Eastford	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	0
Hampton	..	1	1	..	2	..	..	..	..	1	..	..	1	..	3	0
Killingly	..	..	..	..	..	..	..	..	1	..	2	1	..	1	..	0
Plainfield	..	..	..	..	..	1	1	2	..	1	3	2	1	..	1	2
Pomfret	..	..	..	..	..	..	..	1	..	1	..	..	2	..	..	0
Putnam	..	..	..	..	..	2	..	..	1	..	..	1	1	..	2	0
Scotland	..	..	..	..	..	..	1	1	..	2	..	1	..	..	..	0
Sterling	..	..	..	..	..	..	1	..	..	4	...	..	..	..	..	1
Thompson	..	..	..	..	..	1	1	..	..	1	2	..	1	1	2	0
Windham	..	..	..	..	..	1	5	15	13	11	11	12	6	8	8	18
Woodstock	..	2	2	..	..	..	1	..	..	..	...	..	..	..	2	1
LITCHFIELD CO.																
Litchfield	1	1	1	..	1	1	2	..	..	3	1	1	..	..	..	0
Barkhamsted	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	0
Bridgewater	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	0
Canaan	..	..	..	..	1	1	..	..	3	..	..	1	..	1	..	0
Colebrook	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	0
Cornwall	..	1	..	..	..	..	..	..	..	..	..	2	2	..	3	1
Goshen	..	..	1	..	..	..	..	..	2	..	..	..	1	..	..	1
Harwinton	..	..	..	..	1	..	1	..	..	1	..	..	1	..	..	0
Kent	..	..	1	1	1	..	..	..	..	..	..	..	1	2	2	0
Morris	..	..	1	1	..	1	..	..	..	..	..	..	1	1	..	0
New Hartford	..	..	1	2	1	..	2	..	1	..	1	..	..	..	1	3
New Milford	..	..	..	..	..	..	..	..	..	1	..	3	2	..	1	0
Norfolk	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	0
North Canaan	..	..	1	..	1	..	..	1	..	..	..	..	..	1	..	0
Plymouth	3	..	..	1	..	2	6	..	2	4	..	1	2	2	2	0
Roxbury	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	0
Salisbury	..	..	..	1	1	..	3	1	1	1	2	2	3	1	2	0
Sharon	..	2	..	..	1	1	..	..	..	..	2	..	..	..	..	2
Thomaston	..	..	..	..	..	..	..	..	..	1	..	..	3	2	1	0
Torrington	1	3	1	..	2	1	3	..	1	2	1	..	..	1	1	1
Warren	..	..	..	..	..	..	1	..	..	..	2	..	1	..	..	0
Washington	1	..	1	..	..	1	1	1	1	1	..	1	..	..	..	0
Watertown	..	3	..	..	1	2	1	..	..	..	1	..	..	1	1	1
Winchester	..	1	..	1	1	3	2	..	4	1	3	4	3	..	2	1
Woodbury	..	..	..	..	..	..	1	..	..	..	..	.	..	1	2	6
MIDDLESEX CO.																
Middletown	1	6	2	..	..	4	8	2	..	4	4	8	2	2	8	6
Haddam	..	2	..	..	..	2	..	..	..	..	..	4	2	1	1	0
Chatham	..	..	1	..	..	3	3	6	3	..	2	..	..	1	1	0
Chester	..	..	..	..	1	1	..	..	..	..	..	..	..	2	1	0
Clinton	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	0
Cromwell	..	1	..	1	..	..	1	..	1	1	..	..	..	..	..	0
Durham	..	..	..	1	2	2	1	..	..	..	..	1	2	..	2	0
East Haddam	..	..	1	1	..	1	..	1	2	..	1	..	..	..	1	0
Essex	..	..	..	3	1	2	1	1	1	1	..	..	..	..	2	1
Killingworth	..	1	1	..	..	..	..	1	..	1	..	..	..	..	..	0
Middlefield	..	..	..	1	1	2	..	..	1	..	1	..	..	..	..	0
Old Saybrook	..	..	..	.	..	1	..	..	..	..	..	..	..	..	..	0
Portland	..	1	2	1	3	3	..	4	4	2	1	..	3	1	3	4
Saybrook	..	..	..	..	1	2	..	..	1	1	..	3	2	1	..	0
Westbrook	..	..	..	..	1	1	..	..	..	..	..	..	1	..	..	0

	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898
TOLLAND CO.																
Tolland	..	..	..	..	..	..	..	..	..	..	..	..	2	1	1	..
Andover	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..
Bolton	..	1	1	1	..	..	1	..	..	..	1	1	..	..	..	..
Columbia	..	1	1	1	..	1	..	1	1	..	..	2	1	1	..	..
Coventry	..	..	..	..	..	1	1	2	..	3	5	2	2	..	..	..
Ellington	..	..	1	1	1	1	1	1	..	1	..	..	..	..	..	..
Hebron	..	..	..	..	2	..	..	..	3	3	..	..	1	..	..	..
Mansfield	..	1	1	..	1	1	1	2	..	2	4	..	3	1	2	1
Somers	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Stafford	..	1	..	..	..	..	..	2	..	1	..	2	3	1	..	2
Willington	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..
Vernon	..	1	3	1	..	1	1	2	1	2	..	..	1	2	..	6
Other States	..	1	2	8	6	8	2	7	10	7	4	7	16	23	13	11

The following is a summary of the preceding table by towns:

TABLE XLIV

Andover	2	East Haven	3	Monroe	0	Sherman	1
Ansonia	37	East Lyme	6	Montville	9	Simsbury	16
Ashford	6	Easton	2	Morris	5	Somers	1
Avon	5	East Windsor	29	Naugatuck	8	Southbury	6
Barkhamsted	2	Ellington	7	New Britain	239	Southington	26
Beacon Falls	1	Enfield	52	New Canaan	6	South Windsor	14
Berlin	16	Essex	13	New Fairfield	1	Sprague	7
Bethany	2	Fairfield	7	New Hartford	12	Stafford	12
Bethel	15	Farmington	30	New Haven	306	Stamford	55
Bethlehem	0	Franklin	2	Newington	21	Sterling	6
Bloomfield	14	Glastonbury	9	New London	16	Stonington	28
Bolton	6	Goshen	5	New Milford	7	Stratford	24
Bozrah	4	Granby	5	Newtown	16	Suffield	12
Branford	20	Greenwich	9	Norfolk	2	Thomaston	7
Bridgeport	19	Griswold	5	North Branford	8	Thompson	9
Bridgewater	1	Groton	9	North Canaan	4	Tolland	4
Bristol	40	Guilford	11	North Haven	8	Torrington	18
Brookfield	2	Haddam	12	N. Stonington	14	Trumbull	6
Brooklyn	10	Hamden	10	Norwalk	66	Union	0
Burlington	0	Hampton	9	Norwich	85	Vernon	21
Canaan	7	Hartford	284	Old Lyme	6	Voluntown	0
Canterbury	9	Hartland	1	Old Saybrook	1	Wallingford	58
Canton	7	Harwinton	4	Orange	37	Warren	4
Chaplin	6	Hebron	9	Oxford	3	Washington	8
Chatham	20	Huntington	14	Plainfield	14	Waterbury	81
Cheshire	17	Kent	8	Plainville	13	Waterford	1
Chester	5	Killingly	5	Plymouth	25	Watertown	11
Clinton	2	Killingworth	4	Pomfret	4	Westbrook	3
Colchester	20	Lebanon	34	Portland	32	West Hartford	21
Colebrook	2	Ledyard	8	Preston	19	Weston	0
Columbia	10	Lisbon	2	Prospect	1	Westport	17
Cornwall	9	Litchfield	12	Putnam	7	Wethersfield	36
Coventry	16	Lyme	6	Redding	6	Willington	2
Cromwell	5	Madison	15	Ridgefield	8	Wilton	3
Danbury	16	Manchester	45	Rocky Hill	8	Winchester	26
Darien	3	Mansfield	20	Roxbury	2	Windham	108
Derby	20	Marlborough	2	Salem	0	Windsor	13
Durham	11	Meriden	114	Salisbury	18	Windsor Locks	41
Eastford	2	Middlebury	3	Saybrook	11	Wolcott	0
East Granby	3	Middlefield	6	Scotland	5	Woodbridge	5
East Haddam	8	Middletown	57	Seymour	11	Woodbury	4
East Hartford	28	Milford	18	Sharon	8	Woodstock	8
						Total	2,929

Mr. C. D. HINE,
Secretary of State Board of Education.

SIR: — The report of the New Britain State Normal-Training School for the year 1897–1898, including, as you requested, a detailed account of the methods of training now in practice, is herewith respectfully submitted. The school opened Tuesday, September 7th, with the following attendance:

NORMAL-TRAINING DEPARTMENT

Seniors	74
Juniors	87

KINDERGARTEN-TRAINING DEPARTMENT

Seniors	16
Juniors	17
Post-Graduate Students	4
Special	2
Total	200

NUMBER OF CHILDREN ENROLLED IN TRAINING SCHOOLS

New Britain	400	South Manchester	950

The class entering September, 1897, 104 in number, was somewhat smaller than usual. The cause for this may probably be found in the general industrial depression then prevailing, and it may be of interest to know that the entering class of this year (1898) numbers 151, a gain of almost fifty per cent.

SUMMARY

ATTENDANCE BY TOWNS

Forty-nine towns are represented as follows:

Ansonia	2	Glastonbury	1
Berlin	1	Haddam	2
Bloomfield	1	Hartford	40
Bridgeport	2	Huntington	1
Bristol	7	Manchester	7
Canaan	1	Meriden	13
Chester	1	Middletown	12
Colchester	1	Morris	1
Cornwall	1	Naugatuck	1
Danbury	3	New Britain	25
East Granby	1	New London	2
East Hartford	3	Newtown	1
Easton	1	North Canaan	1
East Windsor	1	North Haven	1
Enfield	2	Norwalk	1
Essex	2	Plainville	1
Farmington	3	Plymouth	4

Portland	4	Torrington	1
Ridgefield	2	Waterbury	8
Salisbury	2	West Hartford	1
Simsbury	2	Wethersfield	5
Southington	3	Windsor	2
Stamford	3	Windsor Locks	3
Stratford	2	Woodbury	1
Thomaston	3		

FROM WITHOUT THE STATE

Arkansas	1	New Jersey	1
Canada	1	New York	3
Massachusetts	5		

COUNTIES	STUDENTS	TOWNS
Hartford	109	19
New Haven	25	5
New London	3	2
Fairfield	16	9
Litchfield	15	9
Middlesex	21	5
Total	189	49
From without the State	11	
	200	

DIPLOMAS GRANTED

Graduation exercises were held in Normal Hall, June 24th. The address to the graduates was delivered by Professor Flavel S. Luther. Diplomas were presented to the following list of graduates by His Excellency Lorrin A. Cooke:

Normal Training Course:

Mary F. Anderson,
B. Lavinia Black,
Harriet F. Black,
Effie D. Blackwell,
Nellie S. Brock,
Lottie M. Champlin,
Sophie D. Clark,
Edna J. Cobb,
Edith M. Deming,
Ruth Mabel Doolittle,
Alice S. Ford,
Margaret R. Galvin,
Mary A. Gilshenan,
Alice M. Gray,
Katherine A. Hackett,
Georgia B. Hamilton,
Edna M. Harris,
Jessie M. Herring,
Margaret Jacobi,
Sallie M. Johnson,
Rachel E. Joyner,
Emma P. A. June,
Nellie E. Kahrman,
Loretto May Kane,
Nora R. Kiniry,
Mary E. Kinlock,
Annie I. Laurie,
Mabel E. Laurie,
Mary K. Lawler,
Elizabeth Z. Leghorn,
Marie A. Lynch,
Anna J. Magill,
Edena L. Marsh,
Susie M. Martin,

Elizabeth McGovern,
Helena McHugh,
Alice E. Murray,
Elsie L. Ney,
Josephine S. Nicholas,
Minnie A. Nihill,
Rebecca E. Norton,
Anna A. Quinn,
Bertha T. Robbins,
Daisy P. Seymour,
Emma L. Sheldon,
Margaretha Sporer,
Alice Steele,
Elisa M. Steitz,
Nettie M. Steves,
Georgia B. Viets,
Florence C. Welles,
Susie J. Wheeler,
Margaret M. White,
Katharine Wilcox.

Kindergarten Training Course:

Annie L. Bassette,
Phebe M. Beard,
Grace Chamberlain,
I. Susie Granniss,
Anna B. Griswold,
Grace A. Higgins,
Lottie E. Hune,
Mabel M. Johnson,
Elizabeth R. Johnson,
Francis Pryor Redd,
Mary M. Rodman,
Lucy M. Southmayd,
Elizabeth L. Squier,
Katharine H. Taft,
Helen D. Thorpe,
Esther I. Whittelsey.

Graduate Training Course:

Ella L. Barker,
Edith Smith,
Mary R. Calhoun,
William M. Weeks.

EXTRACT FROM THE ANNOUNCEMENT OF AN ADVANCED COURSE OF STUDY AND TRAINING

"Beginning with the fall of 1897 (September 7th) the New Britain Normal-Training School will offer an advanced course of study and training. This course is laid out to cover one year and it will be open to college and Normal School graduates. It will include

Psychology.
History of education.
A study of educational aims and methods.
Development of course of study for primary and grammar schools.
A special study of some particular phase of school work, e. g., the primary school; departmental work in science.
Observation and practice in model schools.

"The course of study outlined above is designed to meet the needs, first, of college graduates who intend to teach in the common schools and who wish to fit themselves, by professional training, for positions of responsibility, and second, Normal School graduates who feel the need of further study and training. The demand for exceptionally able and well-trained teachers is far in excess of the supply, and positions of responsibility and trust are easily obtained by those who are fit to hold them."

Six students were admitted to this course, and the readiness with which they found superior positions justifies its continuation.

TEACHERS

The list of teachers at the beginning of the year was as follows:

Marcus White, Principal,
Psychology — History of Education.
Ralph G. Hibbard,
Reading.
M. Gertrude Fenn,
Drawing.
Jane Darlington,
Supervisor of Training.
Elizabeth L. Allyn,
Mathematics: Botany; Physiology.
Emily J. Parker,
English; Drawing.
Helen J. Bunce,
Model Schools; Training.
Gertrude L. Rhoades,
Model Schools; Training.
Mary G. Peabody,
Training Schools; Training.
Jessie E. Guernsey,
History.
Bertha M. McConkey,
Training Schools; Supervisor of Training.
Georgiana Minor,
Kindergarten; Training.
Minnie L. Clark,
Model Schools; Training.
Margaret S. Hubbell,
Singing.
Mary A. Spear,
Training Schools; Theory; Training.
Emily B. Scarborough,
Physical Training.
Caroline T. Robbins,
Physical Science.
Frederick A. Verplanck,
Principal of Schools at South Manchester.
Clara M. Washburn,
Model Schools; Training.
Annie L. Parker,
Pianist in Gymnasium.
Maude L. Gridley,
Training Schools; Training.
Marie Curtis,
Assistant; Kindergarten.
Mary E. Goodrich,
Librarian.
Estelle M. Hart,
Model Schools; Training.
Florence M. Prince,
Assistant; Kindergarten.
Mary E. Wardwell,
English.
Estelle I. Pierpont,
Assistant; Kindergarten.
Hannah M. Gartland,
Model Schools; Training.
Anna A. Bubser,
Model Schools; Training.
Ada M. Harding,
Model Schools; Training.
Addie T. Banister,
Model Schools; Training.
Alice O'Grady,
Kindergarten; Theory; Training.
Charles H. Morrill,
Zoology; Geology; Geography.
Grace E. Mowry,
Training Schools; Training.
Sarah T. Palmer,
Training Schools; Training.
Belle W. Hanna,
Principal's Assistant.

The changes in the teaching force last year were more numerous than usual. Miss Fanniebelle Curtis, who had been at the head of the kindergarten department for three years, was appointed supervisor of kindergartens for the city of Brooklyn. Miss Curtis had been a very successful and efficient head of this department, and her resignation was accepted with regret. Miss Alice O'Grady was elected to fill the vacancy. Mr. F. P. Briggs, teacher of science, resigned at the close of the year. His health had been poor throughout the year and his associates here at New Britain have received with great sorrow the news of his recent death. Mr. Charles H. Morrill was elected in his place. Miss Lina D. Wilcox and Miss Jessie Simonson resigned as teachers in the model schools, and Miss Addie T. Banister and Miss Ada M. Harding were elected in their places. Miss Amalie Feibel resigned as assistant in the kindergarten to accept a principalship in Brooklyn.

There were also certain changes at South Manchester. Miss Mary E. Greene resigned to accept a position in Brookline. Her

place as supervisor was taken by Miss Sarah Thompson Palmer, and Miss Grace E. Mowry was elected as an extra supervisor. The school suffered a loss impossible to make good in the death of Miss Mary A. Spear. In the first place the school had been wonderfully fortunate in securing a woman of Miss Spear's ability and reputation. She was one of the great teachers of our country. No true history of education in the United States could be written which did not give to Miss Spear a large share of honor for the progress in teaching which the last half century has witnessed.

OUTLINE OF THE WORK IN TRAINING AT NEW BRITAIN

The training work at New Britain falls into four distinct but related lines and these are :

1. A review of those studies which should be included in a public school course.
2. Observation of work in the Model Schools at New Britain.
3. Practice in teaching in the Model Schools at New Britain and in the Training Schools at South Manchester.
4. A study of psychology, general principles and theories of teaching, school law, and the history of education.

1. In order to develop a course of study for primary and grammar schools, it is necessary to review the studies which ought properly to find a place in those schools. On this account such studies as arithmetic, history, geography, etc., are taken up in the class room, but as far as possible they are treated from a professional standpoint, that is, each subject is put before the training classes in the way in which it should be presented to school children, and the best methods of teaching the various subjects are constantly illustrated.

2. Observation and practice in the Model Schools at New Britain.

As soon as the pupils in the Normal School can profitably enter upon their training work, they are admitted to observation and practice in our Model Schools. The subject of primary reading may be taken as an illustration of the method here employed. In the first place the different methods of teaching reading are discussed by the class, and special attention is given to the methods employed in our own schools. Classes are then taught by the Model School teachers before the young ladies to illustrate what seems to us the best method of teaching reading.

The various school studies are taken up in a similar manner. The pupils are then assigned to the Model Schools and are put in charge of the Model School teachers. While in the Model Schools they are to take notes concerning the details of the school work, prepare themselves the lessons which are assigned to the children, and meet daily the Model School teachers for instruc-

tion, criticisms, etc. They are obliged to prepare complete lesson plans for teaching the lessons of the day, and as soon as satisfactory plans can be prepared they are allowed to teach the classes. The amount of work in teaching given them is increased as their ability to do it successfully increases, and before a pupil is allowed to go to South Manchester, she must be able to teach successfully and hold in order a schoolroom for a whole day. Twenty weeks are devoted to this work in New Britain.

3. At the end of this preparatory work in New Britain the young ladies are assigned to the more independent work at South Manchester. Here each young lady is put in charge of a room of twenty-five or thirty pupils. She is responsible for the discipline and progress of the pupils in these rooms. In no respect now does her work differ from that of a teacher in our public schools except in the fact that she is under much closer supervision, and receives daily counsel and help from the supervisors in charge. Five months must be spent in the Training Schools at South Manchester.

4. The theoretical work in psychology, principles of teaching, etc., is taken up simultaneously with the practice work in teaching. It is a tradition of the school that theory without practice does not amount to very much, and the best work in these lines can be done after the pupils have had the practical experience of the class rooms at South Manchester.

While most of the conditions here at New Britain are extremely favorable for the successful training of teachers, the work is considerably hampered by a lack of room. If possible, some measures should be taken to relieve the present overcrowded condition of the building. Especial attention is called to need of more room for the training classes. The number of children in the Model Schools is adequate for a far greater amount of practice work than can at present be afforded on account of lack of room, and if it is impossible to have a new building for the Model Schools, I recommend that another story be added to the annex.

Another real need of the school is a well-equipped art room. No provision was made in the original plan of the building for such a room, and the present quarters of the art department are too poorly lighted to admit of satisfactory work.

I am pleased to write that our practice schools are visited yearly by an increasing number of superintendents and principals who are discovering that one of the best ways to get acquainted with our graduates is to visit them while actually at work as teachers in our schools.

MARCUS WHITE.

MR. C. D. HINE, *Secretary.*

Sir: — My fifth annual report as principal of the State Normal Training School at Willimantic is herewith respectfully submitted.

The report is for the year ending August 31, 1898 — the ninth year of the school.

REGISTRATION AND ATTENDANCE

Senior Class	50
Middle Class	8
Junior Class	54
Kindergarten Training Class	3
Advanced Class	5
Special Students	4
Whole number enrolled in Normal Department	124
Pupils in Training Schools	602
Total	726

Attendance by Towns. — Forty-two towns are represented as follows:

Andover	1	Hartford	1	Sprague	2
Bozrah	1	Killingly	1	Stafford	2
Brooklyn	3	Lebanon	7	Stonington	6
Canaan	1	Ledyard	1	Thompson	3
Chaplin	1	Lisbon	1	Tolland	1
Chatham	2	Mansfield	4	Vernon	2
Colchester	2	Montville	2	Waterbury	1
Columbia	1	New Hartford	1	Watertown	1
Coventry	1	New London	1	West Hartford	1
East Granby	1	Norwalk	1	Willington	1
East Haddam	1	Norwich	22	Windham	18
Enfield	1	Plainfield	1	Woodstock	2
Griswold	1	Pomfret	2		
Groton	4	Putnam	2	Total	113
Hampton	3	Preston	2		

OTHER STATES.

Maine	1	Rhode Island	1
Massachusetts	6	Vermont	3
			11
Total			124

The registration for the past five years has been as follows:

1893–94	76 pupils	1896–97	119 pupils
1894–95	69 pupils	1897–98	124 pupils
1895–66	87 pupils		

The list of teachers at the beginning of the year was as follows:

George P. Phenix
Psychology
Jennie E. Chapin
Mathematics; Gymnastics; Writing
Grace L. Bell
School at Windham
Emelene A. Dunn
Drawing
Mary G. Henderson
Drawing
Mabel I. Jenkins
History; English
Caroline E. Meacham
Kindergarten
Harriette Wilson
Singing
Sarah J. Walter
Methods: Training
May E. Davison
Grade V
Julia W. Swift
Grade I
Eliza Graeme Graves
Kindergarten Principal
Jennie E. Dennehy
Grade VII
Lucy Chandler
Grade VI
Frederick W. Staebner
Science
Hellen E. Bennett
Kindergarten
Fannie E. Bishop
Kindergarten
Edwin C. Andrews
Grade VIII
Edith W. Griffith
Grade IV
Margaret A. Egan
Grade III

At the close of the year three teachers resigned, namely, Miss Grace L. Bell of Windham, who has been connected with the model schools ever since their establishment, with the exception of one year taken for study; Miss Edith W. Griffith, of Grade IV, and Miss Caroline E. Meacham, who has served as assistant in the Kindergarten for four years.

All three vacancies will be filled by teachers from our present faculty. Miss Julia W. Swift will be transferred to the Windham school. Miss Margaret A. Egan will be moved from Grade III to IV, and Miss Meacham's place will be taken by Miss Fannie A. Bishop.

The positions thus left vacant will be filled by new teachers; Miss Eliza A. Cheyney will have charge of Grade I, Miss Fannie S. Barrows of Grade III, and Miss Anna C. Griswold will become an assistant in the kindergarten. Miss Barrows is a recent graduate of the school, and so does not come as a stranger.

The number of new teachers is unusually small, and as a consequence the next year's work should be the strongest in the history of the school.

TEACHERS' MEETINGS

The plan inaugurated last year of having occasional teachers' meetings on Saturdays for the teachers of Eastern Connecticut, has been continued. Four meetings were held:

November 6. Prof. William North Rice
Commercial Geography
December 4. Dr. E. E. White
Some Fundamental Principles in Teaching

January 8. Prof. William North Rice
The Glacial Period and Connecticut Geography
February 5. Henry Turner Bailey
Place and Power of Drawing in Public Education

TRAINING SCHOOLS

During the past year the schools of the town of Windham have been for the first time under town management. The School Committee voted one year ago to consolidate the schools formerly at Back Roads, Christian Street, Bricktop, and Jerusalem with the Windham Center School. This has increased the number of children in that school to about one hundred. Two new rooms have been opened, making four in all. The school at Windham has been used as a practice school entirely.

TOWN MANAGEMENT

The relations between the Normal School and the First District had always been so harmonious that no advantage to the school was anticipated from the change. There have been many indications during the past year of a keener interest in the public schools, and the abolition of the districts cannot fail to result in better schools.

It gives me pleasure to report that with the change in management of the schools there has been no change in the cordial relations hitherto existing between the school officers of the town and the Normal School.

GRADUATES

On Thursday, June 23d, diplomas were presented by Lieutenant-Governor James D. Dewell to the following candidates:

GENERAL COURSE

Mary L. Ayer, Yantic
Fannie S. Barrows, Stonington
Harriet B. Bradford, Brooklyn
Annie C. Britton, Willimantic
Laura S. Brown, Waterbury
Katherine R. Burke, Holyoke, Mass.
J. Clement Bushnell, Norwich Town
Leone G. Clarke, Willimantic
Celia M. Daley, Moosup
Inez A. Daniels, Uxbridge, Mass.
Alice E. Dickey, Norwich Town
Helen Elizabeth Dyson, Portland
Mary E. Fisk, Stafford
Phila H. Hall, Westford, Vt.
Jane Jackson, Willimantic
Hattie A. Jacobs, Willimantic
Mary L. Keleher, Westerly, R. I.
Gladys L. Lathrop, Willimantic
Kate E. Leavey, Allston, Mass.
Mary E. Lee, Willimantic
Elizabeth G. Lynch, Norwich Town
Julia L. Martin, Chaplin
Annie M. McClimon, Preston
Elizabeth C. McGrath, Mystic
Lizzie I. McNamara, Westerly, R. I.
May Mitchell, Norwich
Mary E. Nelson, Willimantic
Louise B. Newman, Norwich Town
Lena Belle Noyes, Liberty Hill
Florence M. Oddie, Taftville
Minnie T. Pegrum, Watertown
Bessie M. Rathbun, Noank
Winifred E. Rice, Westford, Vt.
Hannah H. Ring, Norwich
Eleanor Rose, Norwich
Grace M. Roraback, Canaan
Rose Spitz, New London
Daisy M. Street, Rockville
Lola M. Trickey, Danielson
Anita R. Woisard, Norwich
Jessie C. Woodward, Vernon Center

KINDERGARTEN TRAINING CLASS

Martha L. Attleton, Boston, Mass. Rose M. Cassidy, Norwich

PRIMARY TRAINING CLASS

Hellen E. Bennett, Norwich Fannie A. Bishop, Norwich

GEORGE P. PHENIX.

MR. C. D. HINE,
Secretary State Board of Education.

Sir: — The annual report of the State Normal Training School at New Haven, for the fifth year of its history, ending June 17, 1898, is hereby respectfully submitted.

The attendance was as follows:

Seniors	58
Juniors	119
Total	177

Fifty-five seniors graduated from the school in June, making in all two hundred and thirty-one graduates of the school.

Miss Helen L. Putnam, teacher of Literature and English, having resigned her position at the end of the preceding year, was succeeded by Miss Mary A. McFarland. This was the only change in the faculty of the normal department.

The Welch School had been used as a model school for three years. It was decided at the end of last year to give it up and to ask the New Haven Board of Education for the school on Orchard street. The request was granted. This building and the Dwight School furnish seventeen rooms for model schools. Thus all of these schools are in one district and are not far from the Normal school.

There were no other unusual events during the year. The needs of the school are constantly studied by those in charge, and changes are made in the details of the course whenever it is deemed advisable to do so. It is believed that the opportunities of the school are economically and pertinently used in the preparation of teachers, and that progress in this respect is made every year.

The attendance for 1898–99 has been as follows:

Seniors	72
Juniors	109
Total	181

Respectfully submitted,

ARTHUR B. MORRILL.

High Schools

SUPPLY

There are in all seventy-seven schools returned as high schools.

The following towns have high schools within their limits:

Ansonia	Groton	North Canaan	Stafford
Bethel	Guilford	Norwalk, 4	Stamford
Branford	Hartford	Old Lyme	Stonington, 4
Bridgeport	Huntington	Old Saybrook	Stratford
Bristol	Killingly	Orange, 2	Suffield
Canton	Litchfield	Plainville	Thomaston
Chatham	Madison	Plymouth, 2	Torrington
Cheshire	Manchester	Portland, 2	Vernon
Colchester	Meriden	Putnam	Wallingford
Danbury	Middletown	Salisbury, 2	Waterbury
Derby	Milford	Saybrook	Watertown
East Hartford	Naugatuck	Seymour	West Hartford
East Lyme	New Britain	Sharon	Wethersfield
Enfield	New Canaan	Somers	Windham
Farmington, 2	New Haven, 3	Southington	Windsor
Greenwich	New Milford	South Windsor, 2	Woodbury

The following towns do not maintain a free public high school and have a valuation under $900,000. They are, therefore, entitled to a State grant to pay tuition fee of scholars who attend in another town:

Andover	Columbia	Killingworth	Roxbury
Ashford	Cornwall	Lebanon	Salem
Avon	Coventry	Ledyard	Scotland
Barkhamsted	Durham	Lisbon	Sherman
Beacon Falls	Eastford	Lyme	Southbury
Bethany	East Granby	Mansfield	Sprague
Bethlehem	East Haven	Marlborough	Sterling
Bloomfield	Easton	Middlebury	Tolland
Bolton	Ellington	Middlefield	Trumbull
Bozrah	Essex	Monroe	Union
Bridgewater	Franklin	Morris	Voluntown
Brookfield	Goshen	New Fairfield	Warren
Burlington	Granby	Newington	Westbrook
Canaan	Haddam	North Branford	Weston
Canterbury	Hampton	North Stonington	Willington
Chaplin	Hartland	Oxford	Wilton
Chester	Harwinton	Prospect	Wolcott
Clinton	Hebron	Redding	Woodbridge — 75
Colebrook	Kent	Rocky Hill	

In the following towns there is no free public high school and there can be no grant for tuition fee, because the grand list exceeds $900,000.00 :

Berlin	Griswold	North Haven	Thompson
Brooklyn	Hamden	Norwich	Washington
Cromwell	Montville	Plainfield	Waterford
Darien	New Hartford	Pomfret	Westport
East Haddam	New London	Preston	Winchester
East Windsor	Newtown	Ridgefield	Woodstock
Fairfield	Norfolk	Simsbury	Windsor Locks
Glastonbury			

DISTRIBUTION

The distribution of high schools by counties is as follows

Hartford County

Number of towns	29
Number of towns having public high schools	14
Number of high schools	16
Number of towns entitled to grant for tuition fee	9

New Haven County

Number of towns	26
Number of towns having public high school	14
Number of high schools	17
Number of towns entitled to grant for tuition fee	10

New London County

Number of towns	21
Number of towns having public high schools	
Number of high schools	8
Number of towns entitled to grant for tuition fee	9

Fairfield County

Number of towns	23
Number of towns having public high schools	9
Number of high schools	12
Number of towns entitled to grant for tuition fee	9

Windham County

Number of towns	15
Number of towns having public high schools	3
Number of high schools	3
Number of towns entitled to grant for tuition fee	5

Litchfield County

Number of towns	26
Number of towns having public high schools	9
Number of high schools	12
Number of towns entitled to grant for tuition fee	12

Middlesex County

Number of towns	15
Number of towns having public high schools	5
Number of high schools	6
Number of towns entitled to grant for tuition fee	8

Tolland County

Number of towns	13
Number of towns having public high schools	3
Number of high schools	3
Number of towns entitled to grant for tuition fee	10

GOVERNMENT

These schools can be divided into three classes conforming to the sections of the law under which they are organized.

Class I

(Sections 2215–2217, Gen. Stat.)

Bristol	East Hartford	Orange	Wethersfield
Chatham	Guilford	Sharon	Windsor
Cheshire	Hartford	Somers	
Danbury	Meriden	Vernon	

Class II

(Sections 2155, 2130, Gen. Stat,)

Colchester
Farmington, Center
Unionville
Greenwich, Meeting-house
Groton, No. 5
Manchester, South Manchester
Middletown
Naugatuck
New Haven, 2
Westville
Norwalk, 4
Orange, West Haven
Plymouth, 2
Portland, 2
Salisbury, 2
South Windsor, 2
Stafford Springs
Stonington, 4
Wallingford
Waterbury
Watertown

Class III

(Sections 2193 *et seq.*, Gen. Stat.)

Ansonia	Huntington	North Canaan	Stamford
Bethel	Killingly	Old Lyme	Stratford
Branford	Litchfield	Old Saybrook	Thomaston
Bridgeport	Madison	Plainville	Torrington
Canton	Milford	Putnam	West Hartford
Derby	New Britain	Saybrook	Windham
East Lyme	New Canaan	Seymour	Woodbury
Enfield	New Milford	Southington	

COURSES OF STUDY

Class I

The following schools report a four-years course :

Ansonia	Groton	New Britain	Torrington
Bridgeport	Guilford	New Haven	Vernon
Bristol	Hartford	Norwalk	Wallingford
Canton	Huntington	Portland, 2	Waterbury
Colchester	Killingly	Putnam	Watertown
Derby	Litchfield	Seymour	West Hartford
East Hartford	Manchester	Southington	Windham
Enfield	Meriden	Stafford	Windsor—39
Farmington	Middletown	Stamford	
Greenwich	Naugatuck	Thomaston	

Class II

The following schools report a three-years course :

Bethel	Milford	Old Saybrook	Saybrook
Branford	New Haven	Orange, 2	South Windsor, 2
Cheshire	Boardman	Plainville	Stonington, 3
Danbury	Norwalk, 2	Salisbury	Wethersfield—21

Class III

The following schools report a two-years course :

Chatham	New Canaan	Plymouth, 2	Stratford
East Lyme	New Milford	Sharon	Woodbury—12
Madison	Norwalk	Stonington	

Class IV

The following schools report a one-year course :

Farmington	North Canaan	Salisbury
New Haven, Westville	Old Lyme	Somers—6

ATTENDANCE

Number of Scholars. In the year 1897–8 the number of scholars registered in these schools was 7,039.

Registration. The registration by classes or years was as follows:

First year	751	Graduate students	87
Second year	1,193	Unclassified	45
Third year	1,899		
Fourth year	3,064	Total	7039

EXPENSE

The expense of these schools cannot always be separated from that of the lower grades if the high school occupies a building or room with other classes.

The expenses summarized below are less rather than more than the actual cost.

Teachers' wages	$266,364.76
Fuel and incidentals	55,010.91
Total	321,375.67

Table XLVI, which follows, is compiled from returns from high school principals:

TABLE XLVI — GENERAL STATISTICS

Town	Maintained by Town or District	No. of Classes	Number in Each Class							Teachers		Number of Graduates in Summer of '98			
			a highest	b	c	d	Graduate Students	Unclassified	Total	Men	Women	One-Year Course	Two-Years Course	Three-Years Course	Four-Years Course
1 Ansonia	Town	4	14	18	24	34	....	....	90	....	4	....	..	....	7
2 Bethel	Town	3	....	15	17	38	1	....	71	1	1	....	....	9	....
3 Branford	Town	3	....	7	9	27	....	....	43	1	2	....	....	....	....
4 Bridgeport	Town	4	49	62	100	221	3	....	435	4	8	....	19	....	45
5 Bristol	Town	4	8	21	33	39	....	1	102	1	5	....	2	....	14
6 Canton	Town	4	18	8	13	34	....	....	73	1	2	....	....	7	14
7 Chatham	Town	2	....	....	11	16	....	....	27	1	1	4	....	....	....
8 Cheshire	Town	3	....	10	15	17	7	....	49	1	1	....	...	12	....
9 Colchester	District	4	5	10	14	23	1	1	54	1	1	....	....	....	11
10 Danbury	Town	3	...	19	39	69	3	....	130	2	2	....	....	23	...
11 Derby	Town	4	6	16	19	22	....	3	66	2	2	....	....	....	12
12 East Hartford	Town	4	6	8	27	34	....	....	75	1	3	....	....	9	....
13 East Lyme	Town	2	....	....	8	9	....	....	17	1	....	....	....	....	....
14 Enfield	Town	4	5	24	22	50	2	....	103	2	3	....	....	....	13
15 Farmington	District	1	....	....	....	16	....	....	16	1	....	....	....	....	....
16 Farmington	Town	4	16	8	18	28	....	....	70	1	2	....	....	....	5
17 Greenwich	District	4	5	11	14	40	1	....	71	1	3	....	....	....	12
18 Groton	District	4	6	3	12	14	....	...	35	1	....	....	....	....	4
19 Guilford	Town	4	3	6	7	17	....	....	33	1	1	....	....	9	....
20 Hartford	Town	4	118	147	198	285	19	....	767	16	22	....	....	....	97
21 Huntington	Town	4	1	8	8	19	....	....	36	1	2	....	....	....	3
22 Killingly	Town	4	6	19	26	27	....	....	78	1	2	....	....	11	5
23 Litchfield	Town	4	7	10	9	13	....	....	39	1	1	....	....	....	5
24 Madison	Town	2	....	....	9	16	....	....	25	....	1	....	....	....	....
25 Manchester	Town	4	18	17	14	41	5	1	96	2	4	....	....	....	11
26 Meriden	Town	4	29	45	54	98	3	....	229	2	9	....	....	3	30
27 Middletown	District	4	33	46	63	89	....	....	231	2	7	....	....	....	33
28 Milford	Town	3	....	8	23	23	....	....	54	1	2	....	....	12	....
29 Naugatuck	District	4	5	16	21	36	....	....	78	2	3	....	....	...	5
30 New Britain	Town	4	59	71	74	117	2	....	323	5	10	....	....	....	47
31 New Canaan	Town	2	....	....	4	28	....	....	32	1	1	....	4	....	....
32 New Haven	District	4	110	132	215	345	3	....	805	14	17	....	15	16	101
33 New Haven	District	3	....	45	80	117	12	3	257	7	10	....	....	23	....
34 New Haven	District	1	....	....	....	10	....	....	10	1	1	5	....	...	....
35 New Milford	Town	2	....	...	9	17	....	....	26	1	....	....	....	....	....
36 North Canaan	Town	1	....	....	....	8	....	....	8	....	1	....	....	....	....
37 Norwalk	District	3	....	6	9	14	....	....	29	1	1	...	..	....	....
38 Norwalk	District	4	5	8	10	17	....	....	40	1	2	....	....	....	4
39 Norwalk	District	3	....	11	30	18	....	....	59	1	2	....	....	17	....
40 Norwalk	District	2	....	....	5	15	....	....	20	1	1	....	....	....	....
41 Old Lyme	Town	1	....	....	....	7	....	....	7	1	....	2	....	....	....
42 Old Saybrook	Town	3	....	5	7	8	....	....	20	1	1	....	....	1	....
43 Orange	Town	3	....	7	4	8	....	....	19	....	1	....	....	3	....
44 Orange	District	3	....	9	15	30	....	....	54	1	2	....	....	6	....
45 Plainville	Town	3	....	4	8	23	....	....	35	1	1	....	....	4	1
46 Plymouth	District	2	....	....	6	5	....	....	11	....	1	....	....	....	....
47 Plymouth	District	2	....	....	7	9	....	....	16	....	1	....	....	....	....
48 Portland	District	4	3	5	7	11	....	....	26	1	1	....	....	....	....
49 Portland	District	4	5	9	12	13	....	....	39	1	2	....	....	....	5
50 Putnam	Town	4	19	17	26	45	1	2	110	2	2	....	....	....	7
51 Salisbury	District	3	....	5	9	16	....	....	30	1	....	....	....	....	....
52 Salisbury	District	3	....	6	6	8	....	....	20	1	....	....	....	....	....
53 Saybrook	Town	3	.. .	10	15	12	....	....	37	1	1	....	....	3	....
54 Seymour	Town	4	7	8	11	23	....	....	49	1	1	....	....	....	5
55 Sharon	Town	2	....	....	10	11	....	....	21	1	....	....	6	....	....
56 Somers	Town	1	....	....	....	20	....	....	20	1	....	....	...	....	....
57 Southington	Town	4	18	18	37	43	5	10	131	1	4	....	1	....	22
58 South Windsor	District	3	....	6	8	14	....	....	28	1	....	....	....	3	....
59 South Windsor	District	3	....	5	5	11	....	....	21	....	1	....	....	2	....
60 Stafford	Town	4	18	11	15	19	....	....	63	1	2	....	....	...	11
61 Stamford	Town	4	28	44	57	75	12	8	224	5	6	....	....	....	26
62 Stonington	District	3	....	3	6	19	....	....	28	....	1	....	....	5	....
63 Stonington	District	2	....	....	2	4	....	2	8	1	....	....	....	....	....
64 Stonington	District	3	....	5	16	11	....	....	32	1	1	....	....	8	....

OF HIGH SCHOOLS, 1897—1898

No. Graduates Entered College in 1898		No. of Graduates entered Normal School — Girls	Number of Scholars from out of Town	Tuition Fee	Weeks in School Year	Expenses			Building	Name of Principal	Post Office
Boys	Girls					Teachers' Wages	Fuel	Incidentals			
2	.....	2	1	$20.00	40	$2,900.00	.....	$240.00	No	Madge E. Richmond.	Ansonia 1
.....	.....	....	....	20.00	40	1,470.00	$77.00	133.00	Yes	E M. Crofoot.....	Bethel..... 2
.....	.....	1	1	25.00	38	1,700.00	36.00	150.00	No	Henry C. Moore.....	Branford 3
4	4	....	40	50.00	40	12,834.03	809.38	5,731.71	No	H. D. Simonds.....	Bridgeport..... 4
2	.....	....	2	40.00	40	4,800.00	377.75	1,868.06	Yes	Elmer S. Hosmer....	Bristol..... 5
1	.....	4	18	30.00	40	2,200.00	75.00	100.00	No	F. H. Davis.....	Collinsville..... 6
.....	.....	....	2	27.00	36	600.00	50.00	73.00	No	James Brooks.....	East Hampton.. 7
.....	1	...	2	25.00	40	1,300.00	75.00	50.00	Yes	Ernest L. Robinson..	Cheshire..... 8
2	1	1	16	18.00	40	1,500.00	63.65	66.27	No	Henry N. Dickinson.	Colchester..... 9
2	2	1	5	25.00	40	2,250.00	.....	1,600.00	No	Frank H. Bennett...	Danbury 10
7	.....	1	14	19.50	39	1,980.00	75.00	75.00	No	J. W. Peck.....	Derby.....11
.....	.....	....	2	19.00	38	2,016.00	179.40	23.66	Yes	James R. Tucker	East Hartford...12
.....	.....	....	1	.....	36	650.00	.....	73.50	No	Pierce D. Brown.....	Niantic.....13
3	1	1	20	30.00	40	3,000.00	75.00	200.00	No	E. H. Parkman.....	Thompsonville..14
.....	.....	....	....	.....	36	800.00	30.00	30.00	No	Albion H. Ross.....	Farmington.....15
.....	.....	3	7	30.00	40	1,880.00	75.00	30.00	No	H. R. Monteith	Unionville.....16
2	2	2	1	40.00	40	3,400.00	50.00	70.00	No	Newton B. Hobart...	Greenwich.....17
.....	.....	....	4	4.50	36	755.00	125.00	150.00	No	Royal L. Cottrell....	Groton 18
.....	.....	..	....	9.50	38	1,456.00	75.00	50.00	No	Carll A. Lewis.....	Guilford.....19
29	6	14	50	114.00	38	38,712.00	....	3,112.44	Yes	Edward H. Smiley...	Hartford 20
2	.....	1	1	20.00	40	1,100.00	50.00	50.00	No	Alton W. Peirce.....	Shelton.....21
1	.....	....	13	38.00	38	2,400.00	60.45	34.00	No	Anrin P. Somes.....	Danielson.....22
.....	.....	....	8	19.00	38	1,694.00	100 00	.....	No	Robert L. Zink.....	Litchfield.....23
.....	.....	....	.....	.....	36	700.00	60.00	171.78	Yes	Mary F. Campbell. ..	Madison.....24
2	.....	5	....	38.00	38	3,500.00	.....	.....	No	Fred'k A. Verplanck.	So. Manchester..25
6	2	3	9	40.00	40	8,750.00	568.37	829.33	Yes	S. T. Frost.....	Meriden.....26
8	.....	4	60	47.50	38	6,075.00	436.37	1,039.09	Yes	W. B. Ferguson	Middletown.....27
.....	.....	1	....	....	38	2,100.00	25.00	85.00	No	H. I. Mathewson ...	Milford.....28
.....	.. ....	2	3	50.00	40	3,000.00	190.00	.....	No	F. W. Eaton	Naugatuck.....29
12	5	8	42	50.00	40	10,497.00	991.43	1,410.84	Yes	Charles F. Harper ...	New Britain....30
.....	.....	1	....	.....	40	1,000.00	22.01	.....	No	George W. Gamble...	New Canaan....31
24	11	18	....	60.00	40	29,304.23	901.30	11,170.00	Yes	Myron T. Scudder...	New Haven 32
2	.....	2	42	60.00	40	16,565.00	.....	9,452.00	Yes	Thomas W. Mather..	New Haven 33
.....	.....	...	6	20.00	40	1,200.00	30 28	62.98	No	C. S. McLean	Westville.....34
.....	.....	....	3	19.00	38	1,200.00	.....	50.00	No	Franklin S. Hoyt....	New Milford....35
.....	.....	....	....	18.00	36	600.00	30.00	30.00	No	Sarah J. Roraback...	Canaan 36
.....	.....	. ..	2	25.00	40	1,200.00	30.00	20.00	No	Charles A. Tucker...	Norwalk.....37
.....	1	....	2	18.00	40	2,000.00	30.00	30.00	No	H. B. Wigham	Norwalk.....38
.....	.....	5	5	24.00	40	1,600.00	60.00	200.00	No	W. C. Foote.....	South Norwalk..39
.....	.....	....	....	.....	40	900.00	40.00	25.00	No	Edward H. Gumbart.	Norwalk.....40
.....	.....	....	....	.....	36	700.00	10.00	10.70	No	Howard W. Pease....	Lyme.....41
.....	.....	....	2	15.00	38	1,300.00	40.00	10.00	No	F A. Curtiss.....	Saybrook..... 42
.....	.....	2	3	.....	38	475.00	72.00	75.00	Yes	Elvira Morrill	Orange 43
.....	.....	4	1	19.50	38	1,500.00	50.00	150 00	No	Edgar C. Stiles.....	West Haven.. .44
.....	.....	....	1	20.00	40	1,650.00	.....	200.00	No	Myron E. Powers....	Plainville.....45
.....	.....	....	1	.....	38	532.00	.....	125.60	No	Mary L. Wright.....	Plymouth.....46
.....	.....	....	..	.....	38	1,000.00	.....	194.67	No	Fred'k D. Hayward..	Terryville.....47
.....	.....	....	4	30.00	40	1,800.00	136.92	137.36	No	George H. Tracy ..	Gildersleeve.....48
.....	1	3	1	.....	40	2,100.00	50.00	75.00	No	Martin W. Griffin....	Portland.....49
.....	.....	....	11	30.00	40	2,850.00	145.00	40.04	Yes	W. H. Holmes, Jr...	Putnam.....50
.....	.....	....	....	.....	38	1,000.00	50.00	50.00	No	Joseph E. Marvin....	Lakeville.....51
.....	.....	....	....	.....	38	800.00	40.00	10.00	No	Albert M. Tibbetts...	Salisbury 52
.....	.....	....	18	15.00	38	1,292.00	73.58	95.17	No	Fred'k N. Hanchett..	Deep River.....53
1	.....	....	2	28.25	39	2,050.00	30.00	200.00	No	Edwin C. Broome....	Seymour.....54
.....	.....	1	2	.....	36	810.00	40.00	.....	No	Walter S. Newell....	Sharon 55
.....	.....	....	1	18.00	36	360.00	10.00	.....	No	Paul A. McQuaid....	Somers.. 56
.....	.....	1	....	57.00	38	3,550.00	350.00	.....	Yes	E. L. Meritt.....	Southington.....57
.....	.....	....	....	....	36	576.00	18.00	30.00	No	James W. Scott.....	South Windsor..58
.....	.....	....	....	.....	36	576.00	25.00	.....	No	Ivy H. Smith.....	Wapping 59
.....	1	1	5	18.00	36	4,500.00	.....	75.00	No	Samuel A. Jacobs....	Stafford Springs.60
5	1	....	10	60.00	40	10,200.00	474.00	1,417.69	Yes	W. R. Jones.....	Stamford 61
.....	.....	....	8	9.00	36	750.00	.....	250.00	No	Harriet E. Park.....	Mystic 62
.....	.....	....	....	.....	36	100.00	25.00	8.00	No	George O. B. Hawley	Old Mystic.....63
.....	.....	2	5	.....	36	1,548.00	75.95	97.55	No	Charles T. Eaton	Stonington.....64

TABLE XLVI — GENERAL STATISTICS

Town	Maintained by Town or District	No of Classes	Number in Each Class							Teachers		Number of Graduates in Summer of '98			
			a highest	b	c	d	Graduate Students	Unclassified	Total	Men	Women	One-Year Course	Two-Years Course	Three-Years Course	Four-Years Course
65 Stonington	District	3	....	6	8	8	2	2	26	1	2	11	7	7	....
66 Stratford	Town	2	....	....	8	12	....	....	20	1	....	....	16	....	....
67 Thomaston	Town	4	5	6	14	15	....	....	40	1	1	....	....	....	8
68 Torrington	Town	4	13	19	20	35	1	2	90	2	8	....	....	....	15
69 Vernon	Town	4	22	24	63	67	1	5	182	3	6	....	....	....	19
70 Wallingford	District	4	17	22	26	32	...	2	99	1	3	....	....	....	8
71 Waterbury	Town	4	16	55	108	208	....	....	387	6	9	....	....	28	14
72 Watertown	District	4	4	3	12	23	....	....	42	1	....	...	....	....	3
73 West Hartford	Town	4	5	5	5	22	1	....	38	1	2	....	....	....	4
74 Wethersfield	Town	3	....	....	12	12	....	....	24	....	2	....	....	5	....
75 Windham	Town	4	31	26	48	51	2	3	161	2	5	....	....	...	20
76 Windsor	Town	4	8	15	14	10	....	....	47	1	1	....	....	....	7
77 Woodbury	Town	2	....	....	9	23	....	....	32	1	....	....	....	....	....
Total	....	....	751	1193	1899	3064	87	45	7039	131	207	22	70	226	653

OF HIGH SCHOOLS, 1897 — 1898

No. Graduates Entered College in 1898		No. of Graduates entered Normal School — Girls	Number of Scholars from out of Town	Tuition Fee	Weeks in School Year	Expenses			Building	Name of Principal	Post-Office
Boys	Girls					Teachers' Wages	Fuel	Incidentals			
.....	.....	1	7	$15.00	36	$2,064.00	$50.00	$100.00	No	E. W. Clarke.....	Westerly, R. I..65
.....	.....	....	2	.....	40	600.00	40.00	10.00	No	J. T. Corlew.....	Stratford 66
.....	.....	....	1	27.00	38	1,675.00	45.00	50.00	No	Geo. T. Cookingham.	Thomaston 67
1	.....	1	5	30.00	40	4,550.00	250.00	500.00	No	Edwin H. Forbes....	Torrington.....68
3	3	3	54	30.00	38	4,250.00	290.79	2,000.00	Yes	Isaac M. Agard.....	Rockville.....69
.....	1	1	2	20.00	40	2,650.00	.....	220.00	No	George F. Fiske.....	Wallingford.....70
5	.....	17	27	30.00	40	15,900.00	.....	850.00	Yes	Stephen W. Wilby...	Waterbury.....71
.....	.....	1	....	.....	36	900.00	40.00	30.00	No	F. J. Werking..	Watertown.....72
.....	.....	....	1	18.50	37	2,168.00	72.46	404.00	No	John H. Peck.....	West Hartford..73
.....	.....	2	...	.....	38	1,500.00	.....	276.06	No	Harriet M. Stone....	Wethersfield....74
1	1	5	35	30.00	40	4,160.50	544.06	893.57	Yes	S. Hale Baker.....	Willimantic.....75
.....	.....	1	2	18.00	36	1,500.00	150.00	350.00	No	F. Everett Smith	Windsor.....76
.....	.....	....	...	18.00	36	840.00	.....	.....	No	William M. Weeks...	Woodbury.....77
127	44	127	....	.....	....	266,364.76	7,588.84	47,422.07	....	.....	....

Following is a summary of these returns from 1892–1898:

TABLE XLVII

Report of Year	No.	4-year	3-year	2-year	1-year	Number Teachers	Registration	Graduates went to College	Graduates went to Normal School	Cost
1892	53	38	10	5	1	...	4,450	...	...	$170,316
1893	55	34	14	6	1	...	4,449	...	...	171,030
1894	59	34	15	10	..	204	4,314	...	...	.....
1895	62	38	8	13	3	212	5,288	155	...	.....
1896	67	38	18	8	3	261	6,061	152	...	229,810
1897	67	36	19	10	2	263	5,907	160	...	230,571
1898	71	35	20	8	8	295	6,672	164	...	275,000.31
1899	77	39	20	12	6	338	7,039	171	127	321,375.67

The following table shows the number of graduates of high schools who entered higher institutions in the fall of 1898:

TABLE XLVIII — COLLEGE OR UNIVERSITY

High School	Conn.					Other States																							
	Yale	Yale, Scientific	Yale, Medical	Trinity	Wesleyan	Harvard	Brown	Holy Cross	Mt. Holyoke	Cornell	Amherst	Cath. Coll., Emmetsb'g, Md	Oberlin	Barnard	Harvard, Medical	Smith	Vassar	Tufts	St. Andrew's	Mass. Inst. of Technology	Stevens Institute	Columbia	Dartmouth	Niagara	Princeton	Wellesley	N. Y. College of Pharmacy
Ansonia	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bridgeport	3	..	..	..	3	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Bristol	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Canton	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cheshire	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Colchester	1	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Danbury	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Derby	4	..	..	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Enfield	1	1	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Greenwich	..	..	..	..	..	..	..	..	..	..	1	..	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Hartford	14	3	1	5	2	1	..	..	..	1	..	..	..	..	1	3	1	..	..	..	3	..	..	..	..	..	..	..
Huntington	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Killingly	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Manchester	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Meriden	6	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Middletown	1	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
New Britain	3	..	..	1	4	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	4	1	1	..	..	..
New Haven	23	..	..	..	..	..	..	..	2	..	..	..	..	..	..	5	1	..	..	..	..	..	..	..	2	1	..
New Haven	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Norwalk	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Portland	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Seymour	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Stafford	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Stamford	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	2	..	..	..	..	..	..
Torrington	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vernon	2	..	..	..	..	..	..	..	2	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Wallingford	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..
Waterbury	2	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Windham	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Totals	62	7	4	10	20	1	2	2	8	5	3	1	1	2	1	14	2	1	1	2	3	3	4	1	1	3	1

The Tables xlix—lvii (pages 106—116) show the number that is occupied for a longer or shorter time with each subject and the recitation time each scholar gives to each subject.

These tables do not give the aggregate recitation time for each subject nor the relative importance of any subject in the program.

The time tables show that the teaching time is given to the several subjects as follows :

Defunct languages	36 per cent.
Modern languages	6 "
Mathematics	20 "
History	8 "
English	10 "
Science	10 "
Miscellaneous	10 "

The study-time of students is given to the several subjects in about the same ratio.

The number pursuing each subject at some time in the course for a longer or shorter period is as follows :

English	2,198	Mathematics	
Rhetoric	1,608	Arithmetic	803
Grammar	649	Algebra	4,027
Literature		Geometry	2,195
English	255	Trigonometry	111
American	148		
History	3,922	Latin	4,088
Civil government	650	Greek	617
Political economy	103	French	1,261
Science		German	1,240
Chemistry	862		
Physics	1,381	Miscellaneous	
Physical geography	1,433	Bookkeeping	970
Geology	370	Manual training	95
Zoology	295	Drawing	2,449
Botany	1,221	Music	3,597
Physiology	816	Stenography	308
Astronomy	131	Gymnastics	1,160

TABLE XLIX — SCIENCE

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Chemistry				Physics				Physical Geography			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	10	10	40	400	6	10	24	240	....	....	....	....
2	Bethel		3	25	47	7	5	....	....	10	5	....	....	29	5	....	....
3	Branford		3	20	23	....	....	....	....	6	5	38	190	....	....	....	....
4	Bridgeport		4	184	251	16	5	20	100	105	5	80	400	60	5	20	100
5	Bristol		4	42	60	8	6	30	180	65	....	60	....	39	....	20	....
6	Canton		4	31	42	....	....	....	....	....	....	....	....	47	5	60	300
7	Chatham		2	9	18	....	....	....	....	....	....	....	....	16	5	16	80
8	Cheshire		3	16	33	....	....	....	....	9	5	40	200	17	5	20	100
9	Colchester		4	28	26	17	4	56	224	13	4	68	272	22	4	20	80
10	Danbury		3	39	91	17	5	28	140	30	5	40	200	19	5	12	60
11	Derby		4	33	33	....	....	....	....	4	5	39	195	....	....	....	....
12	East Hartford		4	30	45	6	5	26	130	8	5	38	190	43	5	22	110
13	East Lyme		2	6	11	....	....	....	....	17	....	....	....	....	....	....	....
14	Enfield		4	40	63	5	2+	40	90	8	3+	70	240	22	5	32	160
15	Farmington	Center	1	6	10	....	....	....	....	....	....	....	....	16	4	20	80
16	"	Unionville	4	35	35	26	3	30	90	24	5	80	400	32	4	30	130
17	Greenwich	Meeting House	4	24	47	8	5	80	400	....	....	....	....	9	5	16	80
18	Groton	Mystic	4	12	23	....	....	....	....	....	....	....	....	....	....	....	....
19	Guilford		4	13	20	3	5	22	110	6	5	38	190	7	5	16	80
20	Hartford		4	331	442	57	5	38	190	70	5	38	190	26	5	13	65
21	Huntington	Ferry	4	10	26	....	....	....	....	1	5	16	80	19	5	20	100
22	Killingly	No. 1, Danielson	4	33	45	15	4	24	96	26	4	30	120	6	....	....	....
23	Litchfield		4	18	21	4	5	18	90	....	....	....	....	....	....	....	....
24	Madison		1	4	5	....	....	....	....	....	....	....	....	8	5	10	50
25	Manchester		4	51	45	10	5	29	145	51	4+	47	197	....	....	....	....
26	Meriden		4	88	141	26	5	40	200	36	5	40	200	....	....	....	....
27	Middletown		4	125	106	26	5	20	100	53	5	38	190	84	5	12	60
28	Milford		3	20	34	....	....	....	....	23	4	50	200	15	4+	38	171
29	Naugatuck	Union Center	4	39	39	13	4	80	320	4	4	40	160	25	4	20	80
30	New Britain		4	147	176	159	80	3+	280	41	5	40	200	21	4	40	160
31	New Canaan		2	17	15	43	5	40	200	43	5	40	200	....	5	20	100
32	New Haven	Hillhouse	4	346	459	106	5	60	300	80	5	60	300	297	4+	80	360
33	"	Boardman	4	157	100	52	4	40	160	16	5	40	200	100	4	20	80
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....	....	....	....	....
35	New Milford	Center	2	11	15	6	2	38	76	6	2	38	76	....	....	....	....
36	North Canaan	No. 2	2	12	14	....	....	....	....	....	....	....	....	10	....	....	....
37	Norwalk	Center	3	12	17	....	....	....	....	8	5	40	200	....	....	....	....
38	"	Over River	4	17	23	3	....	....	....	3	....	....	....	....	....	....	....
39	"	Union	3	24	35	....	....	....	....	....	....	....	....	....	....	....	....
40	"	East Norwalk	2	6	14	....	....	....	....	5	1	24	24	....	....	....	....
41	Old Lyme		1	4	3	....	....	....	....	....	....	....	....	....	....	....	....
42	Old Saybrook		3	7	13	....	....	....	....	5	3	38	114	7	5	28	140
43	Orange	Union, West Haven	3	23	31	....	....	....	....	6	3	38	114	11	3	38	114
44	"		2	6	6	....	....	....	....	11	4	76	304	....	....	....	....
45	Plainville		3	13	22	....	....	....	....	7	5	24	120	12	5	28	140
46	Plymouth		2	1	10	....	....	....	....	....	....	....	....	....	....	....	....
47	"	Terryville, No. 2	2	9	7	....	....	....	....	7	5	38	190	11	2+	19	48
48	Portland	No. 1, Gildersleeve	3	11	9	....	....	....	....	9	5	48	240	9	5	29	145
49	"	No. 2	4	22	17	3	4	40	160	13	4	40	160	12	4	20	80
50	Putnam		4	45	65	9	4	40	160	34	3+	60	200	33	2	40	80
51	Salisbury	Lakeville	3	12	18	16	....	....	....	8	3	20	60	....	....	....	....
52	"	No. 7	3	8	12	....	....	....	....	20	2	78	156	6	1	12	12
53	Saybrook		3	22	15	12	5	15	75	12	5	15	75	....	....	....	....
54	Seymour		4	22	27	....	....	....	....	11	5	24	120	....	....	....	....
55	Sharon		3	8	24	....	....	....	....	4	5	26	130	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	....	....	....	....	....	....	....	....
58	South Windsor	Third District	4	16	16	7	5	72	360	....	....	....	....	....	....	....	....
59	"	Wapping	3	5	16	9	5	36	180	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	....	....	....	....	13	3	36	108	21	3	36	108
61	Stamford		4	94	130	19	4	20	80	17	5	40	200	....	....	....	....
62	Stonington	Third	3	9	19	....	....	....	....	3	5	24	120	....	....	....	....
63	"	Sixth	2	2	6	....	....	....	....	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	16	5	24	120	24	5	36	180
65	"	Eighteenth	4	5	21	....	....	....	....	8	5	36	180	8	5	12	60
66	Stratford		2	3	17	....	....	....	....	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	7	5	30	150	14	5	23	115	12	3	30	90
68	Torrington		6	82	91	3	5	40	200	19	5	40	200	40	4	40	160
69	Vernon	Rockville	4	82	100	15	4	28	112	58	4	28	112	58	4	10	40
70	Wallingford	Central	4	33	66	10	5	80	400	27	3+	120	320	....	....	....	....
71	Waterbury		4	173	214	24	5	40	200	180	5	40	200	92	5	20	100
72	Watertown		4	21	21	7	4	72	288	8	4	72	288	23	4	24	96
73	West Hartford		4	15	23	....	....	....	....	....	....	....	....	....	....	24	....
74	Wethersfield		2	13	11	12	5	8	40	24	5	30	150	24	5	24	120
75	Windham		4	76	85	53	5–	60	260	53	4+	60	260	18	4	12	48
76	Windsor		4	24	23	13	3	16	48	17	2+	72	180	....	....	....	....
77	Woodbury		2	11	21	....	....	....	....	....	....	....	....	23	4	36	144
..	Total		....	3089	4068	862	....	....	....	1381	....	....	....	1433	....	....	....

* Every other year.

TABLE XLIX — SCIENCE — CONTINUED

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Physiology				Astronomy			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	....	....	....	....	14	5	16	80
2	Bethel		3	25	46	21	5	12	60	....	....	....	....
3	Branford		3	20	23	....	....	....	....	....	....	....	....
4	Bridgeport		4	184	251	156	5	20	100	22	4	20	80
5	Bristol		4	42	60	....	....	....	....	....	....	....	....
6	Canton		4	31	42	34	5	10	50	....	....	....	....
7	Chatham		2	9	18	....	....	....	....	....	....	....	....
8	Cheshire		3	16	33	12	5	10	60	....	....	....	....
9	Colchester		4	28	26	....	....	....	....	....	....	....	....
10	Danbury		3	39	91	....	....	....	....	6	5	16	80
11	Derby		4	33	33	....	....	....	....	....	....	....	....
12	East Hartford		4	30	45	28	5	18	90	....	....	....	....
13	East Lyme		2	6	11	....	....	....	....	....	....	....	....
14	Enfield		4	40	53	....	3	28	84	6	2	32	64
15	Farmington	Center	1	6	10	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	....	....	....	....	....	....	....	....
18	Groton	Mystic	4	12	23	....	....	....	....	....	....	....	....
19	Guilford		4	13	20	7	5	12	60	3	5	16	80
20	Hartford		4	331	442	65	5	15	75	....	....	....	....
21	Huntington	Ferry	4	10	26	....	....	....	....	....	....	....	....
22	Killingly	No. 1, Danielson	4	33	45	25	5	10	50	....	....	....	....
23	Litchfield		4	18	21	....	....	....	....	....	....	....	....
24	Madison		1	4	5	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	....	....	....	....	12	5	9	45
26	Meriden		4	88	141	30	5	25	125	....	....	....	....
27	Middletown		4	125	106	92	5	10	50	....	....	....	....
28	Milford		3	20	34	23	5	38	190	....	....	....	....
29	Naugatuck	Union Center	4	39	39	....	....	....	....	....	....	....	....
30	New Britain		4	147	176	....	....	....	....	....	....	....	....
31	New Canaan		2	17	15	....	....	....	....	....	....	....	....
32	New Haven	Hillhouse	4	346	459	45	1	40	40	....	....	....	....
33	"	Boardman	4	157	100	....	....	....	....	....	....	....	....
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....
35	New Milford	Center	2	11	15	....	....	....	....	....	....	....	....
36	North Canaan	No. 2	2	12	14	36	....	108	....	....	....	....	....
37	Norwalk	Center	3	12	17	....	....	....	....	....	....	....	....
38	"	Over River	4	17	23	....	....	....	....	....	....	....	....
39	"	Union	3	24	35	....	....	....	....	11	5	16	80
40	"	East Norwalk	2	6	14	15	4	16	64	....	....	....	....
41	Old Lyme		1	4	3	7	2	36	72	....	....	....	....
42	Old Saybrook		3	7	13	7	5	10	50	....	....	....	....
43	Orange	Union, West Haven	3	23	31	....	....	....	....	....	....	....	....
44	"		2	6	6	....	....	....	....	....	....	....	....
45	Plainville		3	13	22	23	5	16	80	....	....	....	....
46	Plymouth		1	1	10	....	....	....	....	....	....	....	....
47	"	Terryville, No. 2	2	9	7	11	5	19	95	....	....	....	....
48	Portland	No. 1, Gildersleeve	3	11	9	....	....	....	....	....	....	....	....
49	"	No. 2	4	22	17	3	3	20	60	7	5	40	200
50	Putnam		4	45	65	10	2	20	40	10	2	40	80
51	Salisbury	Lakeville	3	12	18	16	....	....	....	....	....	....	....
52	"	No. 7	3	8	12	....	....	....	....	....	....	....	....
53	Saybrook		3	22	15	12	....	28	....	....	....	....	....
54	Seymour		4	22	27	6	5	15	75	7	5	15	75
55	Sharon		3	8	24	....	....	....	....	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	7	5	11	55
58	South Windsor	Third District	4	16	16	....	....	....	....	....	....	....	....
59	"	Wapping	3	5	16	5	5	10	50	....	....	....	....
60	Stafford		4	19	44	....	....	....	....	....	....	....	....
61	Stamford		4	94	130	....	....	....	....	....	....	....	....
62	Stonington	Third	3	9	19	....	....	....	....	....	....	....	....
63	"	Sixth	2	2	6	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	11	5	12	60	....	....	....	....
65	"	Eighteenth	4	5	21	....	....	....	....	....	....	....	....
66	Stratford		2	3	17	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	....	....	....	....	....	....	....	....
68	Torrington		6	82	91	....	....	....	....	14	5	20	100
69	Vernon	Rockville	4	82	100	39	2	15	30	....	....	....	....
70	Wallingford	Central	4	33	66	....	....	....	....	....	....	....	....
71	Waterbury		4	173	214	....	....	....	....	....	....	....	....
72	Watertown		4	21	21	32	3	18	54	....	....	....	....
73	West Hartford		4	15	23	....	....	....	....	....	....	....	....
74	Wethersfield		2	13	11	....	....	....	....	12	5	14	70
75	Windham		4	76	85	17	5	8	40	....	....	....	....
76	Windsor		4	24	23	....	....	....	....	....	....	....	....
77	Woodbury		2	11	21	28	4	24	96	....	....	....	....
..	Total		....	3089	4068	816	....	....	....	131	....	....	....

TABLE XLIX — SCIENCE — CONTINUED

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Geology				Zoology				Botany			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	....	....	....	....	17	4	16	64	24	5	16	80
2	Bethel		3	25	46	4	5	12	60	....	....	....	....	9	5	12	60
3	Branford		3	20	23	....	....	....	....	....	....	....	....	....	....	....	....
4	Bridgeport		4	184	251	60	5	20	100	156	5	20	100	71	4+	60	240
5	Bristol		4	42	60	....	....	....	....	....	....	....	....	17	5	20	100
6	Canton		4	31	42	....	....	....	....	....	....	....	....	....	....	....	....
7	Chatham		2	9	18	....	....	....	....	....	....	....	....	16	5	20	100
8	Cheshire		3	16	33	15	2	40	80	....	....	....	....	17	5	20	100
9	Colchester		4	28	26	....	....	....	....	....	....	....	....	21	4	20	80
10	Danbury		3	39	91	6	....	....	....	....	....	....	....	17	....	....	....
11	Derby		4	33	33	....	....	....	....	....	....	....	....	....	....	....	....
12	East Hartford		4	30	45	4	5	14	70	....	....	....	....	16	5	12	60
13	East Lyme		2	6	11	....	....	....	....	....	....	....	....	....	....	....	....
14	Enfield		4	40	63	....	2	30	60	5	2+	26	68	13	4−	72	20+
15	Farmington	Center	1	6	10	....	....	....	....	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	....	....	....	....	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	1	4	40	160	....	....	....	....	6	5	24	120
18	Groton	Mystic	4	12	23	22	5	20	100	....	....	....	....	34	5	16	80
19	Guilford		4	13	20	....	....	....	....	....	....	....	....	7	5	10	50
20	Hartford		4	331	442	26	5	15	75	....	....	....	....	41	5	15	75
21	Huntington	Ferry	4	10	26	....	....	....	....	....	....	....	....	....	....	....	....
22	Killingly	No. 1, Danielson	4	33	45	16	4	16	64	....	....	....	....	15	4	19	76
23	Litchfield		4	18	21	....	....	....	....	....	....	....	....	....	....	....	....
24	Madison		1	4	5	....	....	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	10	5	16	80	10	5	13	65	....	....	....	....
26	Meriden		4	88	141	....	....	....	....	....	....	....	....	15	5	40	200
27	Middletown		4	125	106	28	5	18	90	23	5	18	90	76	5	16	80
28	Milford		3	20	34	....	....	....	....	....	....	....	....	8	5	9	45
29	Naugatuck	Union Center	4	39	39	....	....	....	....	21	4	20	80	6	4	20	80
30	New Britain		4	147	176	21	4	40	160	....	....	....	....	117	2	40	80
31	New Canaan		2	17	1	43	5	20	100	....	....	....	....	43	5	20	100
32	New Haven	Hillhouse	4	346	459	....	....	....	....	....	4	20	80	90	4	60	240
33	"	Boardman	4	157	100	....	....	....	....	....	....	....	....	114	3	60	160
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....	....	....	....	....
35	New Milford	Center	2	11	15	....	....	....	....	....	....	....	....	....	....	....	....
36	North Canaan	No. 2	2	12	14	....	....	....	....	....	....	....	....	22	4	48	192
37	Norwalk	Center	3	12	17	....	....	....	....	....	....	....	....	....	....	....	....
38	"	Over River	4	17	23	....	....	....	....	....	....	....	....	....	....	....	....
39	"	Union	3	24	35	....	....	....	....	....	....	....	....	18	5	20	100
40	"	East Norwalk	2	6	14	....	....	....	....	....	....	....	....	15	4	16	64
41	Old Lyme		1	4	3	....	....	....	....	....	....	....	....	..	....	....	....
42	Old Saybrook		3	7	13	....	....	....	....	....	....	....	....	....	....	....	....
43	Orange	Union, West Haven	3	23	31	....	....	....	....	....	....	....	....	11	5	13	65
44	"		2	6	6	....	....	....	....	....	....	....	....	7	4	12	48
45	Plainville		3	13	22	....	....	....	....	....	....	....	....	....	....	....	....
46	Plymouth		2	1	10	....	....	....	....	....	....	....	....	....	....	....	....
47	"	Terryville, No. 2	2	9	7	9	2+	16	40	....	....	....	....	10	5	12	60
48	Portland	No. 1, Gildersleeve	3	11	9	3	5	20	100	....	....	....	....	15	5	33	165
49	"	No. 2	4	22	17	3	3	24	72	....	....	....	....	12	4	20	80
50	Putnam		4	45	65	6	2	20	40	....	....	....	....	15	3	20	60
51	Salisbury	Lakeville	3	12	18	....	....	....	....	....	....	....	....	16	....	....	....
52	"	No. 7	3	8	12	....	....	....	....	....	....	....	....	....	....	....	....
53	Saybrook		3	22	15	10	5	28	140	....	....	....	....	15	5	13	65
54	Seymour		4	22	27	6	5	18	90	....	....	....	....	7	5	12	60
55	Sharon		3	8	24	....	....	....	....	....	....	....	....	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	....	....	....	....	....	....	....	....
58	South Windsor	Third District	4	16	16	....	....	....	..	....	....	....	....	6	5	10	50
59	"	Wapping	3	5	16	....	....	....	....	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	....	....	....	....	21	2	36	72	....	....	....	....
61	Stamford		4	94	130	12	4	20	80	11	4	20	80	17	4	20	80
62	Stonington	Third	3	9	19	....	....	....	....	....	....	....	....	6	5	12	60
63	"	Sixth	2	2	6	....	....	....	....	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	....	....	....	....	5	5	24	120
65	"	Eighteenth	4	5	21	....	....	....	....	....	....	....	....	6	5	12	60
66	Stratford		2	3	17	....	....	....	....	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	....	....	....	....	....	....	....	....	5	5	12	60
68	Torrington		6	82	91	21	5	24	120	....	....	....	....	24	5	48	240
69	Vernon	Rockville	4	82	100	15	4	10	40	....	....	....	....	38	2	23	46
70	Wallingford	Central	4	33	66	3	3	20	60	....	....	....	....	18	3	20	60
71	Waterbury		4	173	214	....	....	....	....	....	....	....	....	92	5	20	100
72	Watertown		4	21	21	....	....	....	....	....	....	....	....	16	3	36	108
73	West Hartford		4	15	23	....	....	....	....	....	....	....	....	....	....	12	....
74	Wethersfield		2	13	11	18	4	16	64	17	5	16	80	17	5	16	80
75	Windham		4	76	85	8	2	16	32	8	3	21	63	15	3	20	60
76	Windsor		4	24	23	....	....	....	....	....	....	....	....	....	....	....	....
77	Woodbury		2	11	21	....	....	....	....	6	4	24	96	....	....	....	....
..	Total		....	3089	4068	370	....	....	....	205	....	....	....	1221	....	....	....

TABLE L — ENGLISH

Number.	Town	District	Number years in course	Whole No. Sch'l'rs		English				Rhetoric				Grammar			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. period in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	62	1+	95	174	....	....	....	....	....	....	....	....
2	Bethel		3	25	46	....	....	....	....	38	5	....	....	....	....	....	....
3	Branford		3	20	23	....	....	....	....	25	5	38	190	....	....	....	....
4	Bridgeport		4	184	251	218	5	40	200	....	....	....	....	....	....	....	....
5	Bristol		4	42	60	....	....	....	....	33	5	40	200	39	1	40	40
6	Canton		4	31	42	....	....	....	....	39	....	100	300	34	4	40	160
7	Chatham		2	9	18	....	....	....	....	11	5	36	180	....	....	....	....
8	Cheshire		3	16	33	....	....	....	....	15	3	40	120	17	5	20	100
9	Colchester		4	28	26	....	....	....	....	37	1	80	80	....	....	....	....
10	Danbury		3	39	91	....	....	....	....	67	5	40	200	....	....	....	....
11	Derby		4	33	33	63	5	109	545	*	....	....	....	*	....	....	....
12	East Hartford		4	30	45	75	1+	152	190	28	5	38	190	....	....	....	....
13	East Lyme		2	6	11	....	....	....	....	17	....	....	....	....	....	....	....
14	Enfield		4	40	63	101	1	150	150	50	5	30	150	5	2	10	23
15	Farmington	Center	1	6	10	....	....	....	....	....	....	....	....	16	4	36	144
16	"	Unionville	4	35	35	....	....	....	....	16	2	20	40	43	2+	70	170
17	Greenwich	Meeting House	4	24	47	40	3	40	120	14	3	40	120	....	....	....	....
18	Groton		4	12	23	....	....	....	....	26	4	240	....	....	....	....	....
19	Guilford		4	13	20	....	....	....	....	6	5	38	190	24	5	76	380
20	Hartford		4	331	442	†....	....	....	....	82	1	38	38	....	....	....	....
21	Huntington	Ferry	4	10	26	....	....	....	....	7	5	40	200	....	....	....	....
22	Killingly	No. 1, Danielson	4	33	45	....	....	....	....	30	4	38	114	....	....	....	....
23	Litchfield		4	18	21	....	....	....	....	23	5	76	380	7	5	38	190
24	Madison		1	4	5	25	....	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	....	....	....	....	41	1	38	38	....	....	....	....
26	Meriden		4	88	141	106	2	120	240	98	2	40	80	....	....	....	....
27	Middletown		4	125	106	....	....	....	....	7	5	76	380	....	....	....	....
28	Milford		3	20	34	23	4	38	152	8	4+	30	135	23	5	38	160
29	Naugatuck		4	39	39	....	....	....	....	21	4	40	160	36	4	40	160
30	New Britain		4	147	176	295	4+	160	680	....	....	....	....	....	....	....	....
31	New Canaan		2	17	15	....	....	....	....	17	5	20	100	43	5	60	300
32	New Haven	Hillhouse	4	346	459	....	....	....	....	....	....	....	....	....	....	....	....
33	"	Boardman	4	157	100	136	3	40	120	75	2	40	80	....	....	....	....
34	"	Westville	1	3	7	10	5	40	200	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	....	....	....	....	17	5	38	190	....	....	....	....
36	North Canaan		2	12	14	10	5	....	....	....	....	....	....	26	4	....	....
37	Norwalk	Center	3	12	17	6	5	40	200	23	5	80	400	....	....	....	....
38	"	Over River	4	17	23	17	....	....	....	11	....	....	....	....	....	....	....
39	"	Union	3	24	35	....	....	....	....	48	5	80	400	....	....	....	....
40	"	East Norwalk	2	6	14	....	....	....	....	5	4	40	160	15	3	40	120
41	Old Lyme		1	4	3	....	....	....	....	....	....	....	....	7	2	14	28
42	Old Saybrook		3	7	13	....	....	....	....	15	5	66	330	18	5	10	50
43	Orange	West Haven	3	23	31	....	....	....	....	15	....	38	....	....	....	....	....
44	"		2	6	6	....	....	....	....	12	2	76	152	1	4	38	152
45	Plainville		3	13	22	....	....	....	....	7	5	28	140	23	....	....	....
46	Plymouth		2	1	10	....	....	....	....	11	2	44	88	....	....	....	....
47	"	Terryville, No. 2	2	9	7	....	....	....	....	9	5	19	95	11	2+	38	95
48	Portland	No. 1, Gildersleeve	3	11	9	12	5	80	400	19	5	120	600	16	5	80	400
49	"	No. 2,	4	22	17	33	3	40	120	29	3	40	120	....	....	....	....
50	Putnam		4	45	65	....	....	....	....	108	4†	140	440	....	....	....	....
51	Salisbury	Lakeville	3	12	18	291	4	108	468	....	....	....	....	....	....	....	....
52	"	No. 7,	3	8	12	....	....	....	....	20	4	36	144	....	....	....	....
53	Saybrook		3	22	15	....	....	....	....	10	5	28	140	....	....	....	....
54	Seymour		4	22	27	7	5	....	....	8	5	39	195	....	....	....	....
55	Sharon		3	8	24	....	....	....	....	....	....	....	....	15	3	26	78
56	Somers		2	5	15	....	....	....	....	20	....	....	....	20	....	....	....
57	Southington		4	56	75	106	4+	98	468	....	....	....	....	....	....	....	....
58	South Windsor	Third District	4	16	16	8	5	36	180	6	5	36	180	14	5	36	180
59	"	Wapping	3	5	16	11	5	36	180	3	5	36	180	5	5	10	50
60	Stafford		4	19	44	21	2	36	72	12	3	36	108	....	....	....	....
61	Stamford		4	94	130	129	4	80	320	72	4	80	320	....	....	....	....
62	Stonington	Third	3	9	19	....	....	....	....	5	5	12	60		....	....	....
63	"	Sixth	2	2	6	....	....	....	....	8	5	48	240	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	11	5	24	120	24	5	36	180
65	"	Eighteenth	4	5	21	....	....	....	....	8	5	24	120	....	....	....	....
66	Stratford		2	3	17	20	5	80	400	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	....	....	....	....	5	1	38	38	....	....	....	....
68	Torrington		6	82	91	‡83	3+	80	280	13	1	40	40	90	4	120	480
69	Vernon	Rockville	4	82	100	‖109	3+	113	375	38	5	38	190	29	2	23	46
70	Wallingford	Central	4	33	66	....	....	....	....	31	5	40	200	....	....	....	....
71	Waterbury		4	173	214	391	4	120	480	128	4	80	320	....	....	....	....
72	Watertown		4	21	21	42	1	144	....	....	....	....	....	23	4	36	144
73	West Hartford		4	15	23	....	....	....	....	5	2	37	74	4	5	37	185
74	Wethersfield		2	13	11	....	....	....	....	12	2	38	76	11	5	38	190
75	Windham		4	76	85	....	....	....	....	....	....	....	....	....	....	....	....
76	Windsor		4	24	23	10	2	36	72	22	2+	72	180	....	....	....	....
77	Woodbury		2	11	21	....	....	....	....	11	5	24	120	20	5	24	120
..	Total		....	3080	4068	2108	....	....	....	1608	....	....	....	640	....	....	....

* Included in "English." † Included in English Literature. ‡ Reading.
‖ Includes Grammar, Rhetoric, and Literature.

TABLE LI — LITERATURE

Number.	Town	District	Number years in course	Whole No. Sch'l'rs		English Literature				American Literature			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	31	4	64	280	34	3	40	120
2	Bethel		3	25	46	....	....	....	....	....	....	....	....
3	Branford		3	20	23	22	5	76	380	....	....	....	....
4	Bridgeport		4	184	251	112	5	40	200	....	....	....	....
5	Bristol		4	42	60	62	4—	120	440	39	3	40	120
6	Canton		4	31	42	....	....	....	....	18	3	20	60
7	Chatham		2	9	18	11	3	20	60	....	....	....	....
8	Cheshire		3	16	33	....	....	....	....	....	....	....	....
9	Colchester		4	28	26	52	1+	184	336	....	....	....	....
10	Danbury		3	39	91	19	5	28	140	....	....	....	....
11	Derby		4	33	33	*....	....	....	....	....	....	....	....
12	East Hartford		4	30	45	15	5	36	180	6	5	14	70
13	East Lyme		2	6	11	17	....	....	....	....	....	....	....
14	Enfield		4	40	63	101	2—	130	250	....	....	....	....
15	Farmington	Center	1	6	10	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	30	2+	120	280	....	....	....	....
18	Groton		4	12	23	....	....	....	....	9	3	72	216
19	Guilford		4	13	20	....	....	....	....	....	....	....	....
20	Hartford		4	331	442	588	3+	129	375	....	....	....	....
21	Huntington	Ferry	4	10	26	3	5	80	400	....	....	....	....
22	Killingly	No. 1, Danielson	4	33	45	40	4	76	304	....	....	....	....
23	Litchfield		4	18	21	39	5	152	760	....	....	....	....
24	Madison		1	4	5	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	90	152	3+	532	....	....	....	....
26	Meriden		4	88	141	22	5	40	200	....	....	....	....
27	Middletown		4	125	106	231	2	152	304	....	....	....	....
28	Milford		3	20	34	8	4	38	152	....	....	....	....
29	Naugatuck		4	39	30	16	4	40	160	4	4	40	160
30	New Britain		4	147	176	....	....	....	....	....	....	....	....
31	New Canaan		2	17	15	43	5	80	400	....	....	....	....
32	New Haven	Hillhouse	4	346	459	....	....	....	....	....	....	....	....
33	"	Boardman	4	157	100	46	3	40	120	....	....	....	....
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	9	5	38	190	17	5	38	190
36	North Canaan		2	12	14	....	....	....	....	....	....	....	....
37	Norwalk	Center	3	12	17	8	5	40	200	....	....	....	....
38	"	Over River	4	17	23	38	....	....	....	....	....	....	....
39	"	Union	3	24	35	11	5	30	150	....	....	....	....
40	"	East Norwalk	2	6	14	20	3	48	144	....	....	....	....
41	Old Lyme		1	4	3	7	5	36	180	....	....	....	....
42	Old Saybrook		3	7	13	5	5	38	190	....	....	....	....
43	Orange	West Haven	3	23	31	9	3	38	114	....	....	....	....
44	"		2	6	6	7	1	8	8	....	....	....	....
45	Plainville		3	13	22	7	5	24	120	....	....	....	....
46	Plymouth		2	1	10	11	5	32	160	....	....	....	....
47	"	Terryville	2	9	7	....	....	....	....	....	....	....	....
48	Portland	No. 1, Gildersleeve	3	11	9	19	5	120	600	....	....	....	....
49	"	No. 2	4	22	17	5	3	20	60	....	....	....	....
50	Putnam		4	45	65	....	....	....	....	....	....	....	....
51	Salisbury	Lakeville	3	12	18	28	4	108	468	....	....	....	....
52	"	No. 7	3	8	12	20	5	78	390	....	....	....	....
53	Saybrook		3	23	15	10	5	38	190	....	....	....	....
54	Seymour		4	22	27	....	....	....	....	....	....	....	....
55	Sharon		3	8	24	29	4	72	332	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	....	....	....	....
58	South Windsor	Third District	4	16	16	4	5	36	180	....	....	....	....
59	"	Wapping	3	5	16	5	5	36	180	....	....	....	....
60	Stafford		4	19	44	19	3	36	108	....	....	....	....
61	Stamford		4	94	130	49	3	60	180	....	....	....	....
62	Stonington	Third	3	9	19	....	....	....	....	....	....	....	....
63	"	Sixth	2	2	6	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	....	....	....	....
65	"	Eighteenth	4	5	21	2	5	36	180	....	....	....	....
66	Stratford		2	3	17	20	5	80	400	....	....	....	....
67	Thomaston		4	24	26	9	5	76	380	....	....	....	....
68	Torrington		6	82	91	32	3	80	240	21	2	40	80
69	Vernon	Rockville	4	82	100	....	....	....	....	....	....	....	....
70	Wallingford	Central	4	33	66	65	4—	100	380	....	....	....	....
71	Waterbury		4	173	214	....	....	....	....	....	....	....	....
72	Watertown		4	21	21	....	....	....	....	....	....	....	....
73	West Hartford		4	15	23	5	3	26	78	....	....	....	....
74	Wethersfield		2	13	11	12	3	38	114	....	....	....	....
75	Windham		4	76	85	*157	4+	160	520	....	....	....	....
76	Windsor		4	24	23	35	3—	108	288	....	....	....	....
77	Woodbury		2	11	21	....	....	....	....	....	....	....	....
	Total		....	3089	4068	2255	....	....	....	148	....	....	....

* Includes Rhetoric and Grammar.

TABLE LII — LANGUAGES

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Defunct								Modern							
						Latin				Greek				French				German			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	71	5—	160	760	6	5	120	480	....	....	....	....	26	5	80	400
2	Bethel		3	25	46	25	5	....	....	....	....	....	....	....	....	....	....	4	5	....	....
3	Branford		3	20	23	47	5	114	570	....	....	....	....	7	5	38	190	....	....	....	....
4	Bridgeport		4	184	251	251	5	160	800	37	5	120	600	51	5	80	400	96	5	80	400
5	Bristol		4	42	60	41	5	120	600	11	5	80	400	17	5	80	400	27	5	80	400
6	Canton		4	31	42	48	5	160	800	2	5	40	200	21	5	120	600	30	5	160	800
7	Chatham		2	9	18	27	5	72	360	....	....	....	....	....	....	....	....	....	....	....	....
8	Cheshire		3	16	33	32	5	120	600	....	....	....	....	9	5	80	400	10	5	80	400
9	Colchester		4	28	26	25	5	120	600	3	5	40	200	7	5	120	600	22	5	160	800
10	Danbury		3	39	91	69	5	120	600	9	5	80	400	22	....	....	....	15	....	....	....
11	Derby		4	33	33	46	5	156	780	2	5	39	195	28	5	117	585	5	5	39	195
12	East Hartford		4	30	45	56	5	152	760	....	....	....	....	1	5	38	190	....	....	....	....
13	East Lyme		2	6	11	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
14	Enfield		4	40	63	68	4	160	640	9	4+	160	520	46	3	120	360	5	3	120	360
15	Farmington	Center	1	6	10	18	5	36	180	....	....	....	....	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	45	5	160	800	10	5	40	200	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	52	5—	160	760	7	4	40	160	....	....	....	....	22	4	120	480
18	Groton	Mystic	4	12	23	34	4+	144	648	14	3+	144	396	....	....	....	....	....	....	....	....
19	Guilford		4	13	20	24	5	152	760	....	....	....	....	....	....	....	....	3	5	38	190
20	Hartford		4	331	442	452	5	152	760	79	5	114	570	390	5	114	570	127	5	114	570
21	Huntington	Ferry	4	10	26	32	5	120	600	3	5	80	400	4	5	120	600	....	....	....	....
22	Killingly	No. 1	4	33	45	31	4	152	608	4	....	....	....	23	4	76	304	....	....	....	....
23	Litchfield		4	18	21	34	5	152	760	....	....	....	....	....	....	....	....	7	5	38	190
24	Madison		1	4	5	9	5	10	50	....	....	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	34	5—	143	686	7	5	114	570	15	5	28	190	20	5	114	570
26	Meriden		4	88	141	185	5	160	800	20	4+	120	520	40	5	80	400	33	5	80	400
27	Middletown		4	125	106	101	5	152	760	17	5	114	570	40	5	152	760	44	5	152	760
28	Milford		3	20	34	25	4+	114	475	....	....	....	....	....	....	....	....	....	....	....	....
29	Naugatuck		4	39	39	34	4	160	640	4	4	40	160	....	....	....	....	37	4	80	320
30	New Britain		4	147	176	161	5—	160	760	44	5—	120	560	140	4+	160	520	36	4+	120	520
31	New Canaan		2	17	15	39	4	80	320	....	....	....	....	....	....	....	....	....	....	....	....
32	New Haven	Hillhouse	4	346	459	525	4+	160	680	132	4+	120	520	100	4	120	480	203	4	120	480
33	"	Boardman	4	157	100	70	5	120	600	....	....	....	....	....	....	....	....	71	5	80	400
34	"	Westville	1	3	7	10	5	40	200	....	....	....	....	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	12	3	38	114	....	....	....	....	....	....	....	....	10	4	38	152
36	North Canaan		2	12	14	24	4	72	288	....	....	....	....	....	....	....	....	....	....	....	....
37	Norwalk	Center	3	12	17	25	5	120	600	....	....	....	....	....	....	....	....	14	5	80	400
38	"	Over River	4	17	23	32	..	160	....	9	....	....	....	....	....	....	....	26	....	....	....
39	"	Union	3	24	35	50	5	120	600	....	....	....	....	....	....	....	....	41	5	80	400
40	"	East Norwalk	2	6	14	20	5	80	400	....	....	....	....	....	....	....	....	15	3	40	120
41	Old Lyme		1	4	3	7	3	36	108	....	....	....	....	....	....	....	....	....	....	....	....
42	Old Saybrook		3	7	13	20	5	38	190	....	....	....	....	....	....	....	....	....	....	....	....
43	Orange	West Haven	3	23	31	45	5	76	380	....	....	....	....	....	....	....	....	9	5	38	190
44	"		2	6	6	10	3	76	228	....	....	....	....	....	....	....	....	....	....	....	....
45	Plainville		3	13	22	13	5	80	400	....	....	....	....	4	5	40	160	....	....	....	....
46	Plymouth		2	1	10	10	5	76	380	....	....	....	....	....	....	....	....	....	....	....	....
47	"	Terryville, No. 2	2	9	7	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
48	Portland	No. 1, Gildersleeve	3	11	9	16	5	120	600	3	5	40	200	....	....	....	....	3	3	76	228
49	"	No. 2	4	22	17	25	5	160	800	....	....	....	....	....	....	....	....	....	....	....	....
50	Putnam		4	45	65	52	5	160	800	19	4+	120	560	53	4+	120	600	11	4+	80	360
51	Salisbury	Lakeville	3	12	18	29	3	108	324	....	....	....	....	....	....	....	....	17	4+	120	520
52	"	No. 7	3	8	12	10	5	114	570	....	....	....	....	....	....	....	....	....	....	....	....
53	Saybrook		3	22	15	25	5	66	330	....	....	....	....	....	....	....	....	2	3	....	....
54	Seymour		4	22	27	20	5	156	780	....	....	....	....	....	....	....	....	....	....	....	....
55	Sharon		3	8	24	15	5	72	360	....	....	....	....	....	....	....	....	2	3	39	117
56	Somers		2	5	15	7	5	36	180	....	....	....	....	13	5	72	360	....	....	....	....
57	Southington		4	56	75	63	5	152	760	11	4	70	280	24	5	76	380	2	3	70	210
58	South Windsor	Third	4	16	16	13	5	144	720	....	....	....	....	....	....	....	....	....	....	....	....
59	"	Wapping	3	5	16	5	5	36	180	....	....	....	....	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	22	5	144	720	7	5	108	540	29	5	108	540	8	3	108	324
61	Stamford		4	94	130	94	5—	160	760	23	4+	120	580	19	3+	80	280	76	4+	120	520
62	Stonington	Third	3	9	19	28	5	108	540	....	....	....	....	....	....	....	....	....	....	....	....
63	"	Sixth	2	2	6	7	3	72	216	....	....	....	....	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	32	5	108	540	....	....	....	....	....	....	....	....	....	....	....	....
65	"	Eighteenth	4	5	21	22	5	108	540	....	....	....	....	7	5	72	360	7	5	72	360
66	Stratford		2	3	17	10	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	24	5	152	760	2	5	76	380	....	....	....	....	11	5	76	380
68	Torrington		6	82	91	80	5	200	1000	15	4+	80	360	30	5	80	400	19	5	80	400
69	Vernon	Rockville	4	82	100	63	5	151	755	12	5	113	565	41	5	113	565	23	5	113	565
70	Wallingford	Central	4	33	66	61	5	160	800	24	5	120	600	15	5	120	600	28	5	80	400
71	Waterbury		4	173	214	198	5	120	600	50	5	120	600	94	5	80	400	48	5	80	400
72	Watertown		4	21	21	7	4+	72	314	....	....	....	....	....	....	....	....	....	....	....	....
73	West Hartford		4	15	23	29	5	148	740	....	....	....	....	14	5	37	185	8	5	37	185
74	Wethersfield		2	13	11	6	5	76	380	....	....	....	....	....	....	....	....	....	....	....	....
75	Windham		4	76	85	81	5	160	800	13	5	120	600	57	5	80	400	....	....	....	....
76	Windsor		4	24	23	12	5	144	720	....	....	....	....	....	....	....	....	17	5	72	360
77	Woodbury		2	11	21	27	5	72	360	9	4	36	144	....	....	....	....	....	....	....	....
	Total		....	3089	4068	4088	....	....	....	617	....	....	....	1261	....	....	....	1240	....	....	....

TABLE LIII — MATHEMATICS

Number.	Town	District	Number years in course	Whole No. Sch'l'rs		Arithmetic				Algebra				Geometry				Trigonometry			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	....	....	....	....	58	5	68	340	17	5	40	200	3	5	12	60
2	Bethel		3	25	46	....	....	....	....	55	5	....	....	15	5	....	....	....	....	....	....
3	Branford		3	20	23	....	....	....	....	43	5	76	380	7	5	38	190	....	....	....	....
4	Bridgeport		4	184	251	65	3	20	60	249	4+	80	360	109	4+	80	300	8	5	20	100
5	Bristol		4	42	60	....	....	....	....	41	4	60	260	25	4+	90	410	2	5	10	50
6	Canton		4	31	42	35	5	50	250	72	5	130	650	....	....	....	....	....	....	....	....
7	Chatham		2	9	18	....	....	....	....	27	5	72	360	....	....	....	....	....	....	....	....
8	Cheshire		3	16	33	17	5	25	125	32	5	55	275	12	5	40	200	....	....	....	....
9	Colchester		4	28	26	....	....	....	....	23	4	40	160	10	4	40	160	....	....	....	....
10	Danbury		3	39	91	19	5	12	60	107	5	56	180	59	5	40	200	....	....	....	....
11	Derby		4	33	33	....	....	....	....	41	5	78	390	16	5	39	195	....	....	....	....
12	East Hartford		4	30	45	....	....	....	....	61	5	76	380	11	5+	40	202	....	....	....	....
13	East Lyme		2	6	11	....	....	....	....	16	....	....	....	8	....	....	....	....	....	....	....
14	Enfield		4	40	63	14	3	40	170	60	4—	100	395	60	4	70	280	....	4	24	96
15	Farmington		1	6	10	....	....	....	....	16	5	36	180	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	....	....	....	....	52	5	120	600	16	5	40	200	....	....	....	....
17	Greenwich		4	24	47	....	....	....	....	57	4+	80	360	12	3+	80	280	....	....	....	....
18	Groton		4	12	23	....	....	....	....	29	....	....	....	6	....	....	....	....	....	....	....
19	Guilford		4	13	20	17	5	12	60	30	5	102	510	7	5	76	380	....	....	....	....
20	Hartford		4	331	442	....	....	....	....	335	4+	53	220	237	5	53	265	28	5	15	75
21	Huntington		4	10	26	....	....	....	....	23	5	40	200	16	5	56	280	....	....	....	....
22	Killingly	Danielson	4	33	45	21	4	20	80	27	4	38	152	26	4	30	120	....	....	....	....
23	Litchfield		4	18	21	7	5	38	190	19	5	54	270	4	5	16	80	....	....	....	....
24	Madison		1	4	5	....	....	....	....	14	5	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	....	....	....	....	55	3+	47	179	26	5—	54	241	....	....	....	....
26	Meriden		4	88	141	71	3	80	240	98	5	40	200	54	5	40	200	....	....	....	....
27	Middletown		4	125	106	....	....	....	....	156	5	56	280	119	5	56	280	....	....	....	....
28	Milford		3	20	34	23	4+	21	95	58	4+	92	376	12	4+	23	104	....	....	....	....
29	Naugatuck		4	39	39	13	....	....	....	43	5	80	400	20	4	80	320	....	....	....	....
30	New Britain		4	147	176	....	....	....	....	117	4+	40	180	79	5—	80	380	....	....	....	....
31	New Canaan		2	17	15	43	3	60	180	43	4	80	320	43	3+	80	280	....	....	....	....
32	New Haven	Hillhouse	4	346	459	....	....	....	....	487	4	88	320	379	4	52	340	21	5	20	100
33	"	Boardman	4	157	100	....	....	....	....	138	5	60	300	98	5	60	300	34	4	50	170
34	"	Westville	1	3	7	....	....	....	....	10	4+	40	180	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	....	....	....	....	27	5	76	380	10	5	20	100	....	....	....	....
36	North Canaan		2	12	14	....	....	....	....	26	....	....	....	26	4+	....	....	....	....	....	....
37	Norwalk	Center	3	12	17	....	....	....	....	23	5	80	400	6	5	40	200	....	....	....	....
38	"	Over River	4	17	23	....	....	....	....	35	....	....	....	3	....	....	....	....	....	....	....
39	"	Union	3	24	35	18	5	40	200	18	5	40	200	30	5	40	200	....	....	....	....
40	"	East Norwalk	2	6	14	5	1	40	40	15	5	40	200	5	5	40	200	....	....	....	....
41	Old Lyme		1	4	3	....	....	....	....	7	5	36	180	....	....	....	....	....	....	....	....
42	Old Saybrook		3	7	13	8	5	10	50	7	5	38	190	5	5	38	190	....	....	....	....
43	Orange	West Haven	3	23	31	....	....	....	....	45	5	76	380	9	5	38	190	....	....	....	....
44	"		2	6	6	3	4	44	176	2	4	32	128	7	2	38	76	....	....	....	....
45	Plainville		3	13	22	26	5	56	280	11	5	52	260	4	5	40	200	....	....	....	....
46	Plymouth		2	1	10	4	5	38	190	10	5	76	380	....	....	....	....	....	....	....	....
47	"	Terryville, No. 2	2	9	7	11	5	19	95	9	5	38	190	7	5	38	190	....	....	....	....
48	Portland	Gildersleeve, No. 1	3	11	9	16	5	29	145	19	5	120	600	3	5	40	200	....	....	....	....
49	"	No. 2	4	22	17	13	2	40	80	30	4	100	380	15	4—	100	340	....	....	....	....
50	Putnam		4	45	65	....	....	....	....	73	3	100	300	25	4	40	160	....	....	....	....
51	Salisbury	Lakeville	3	12	18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
52	"		3	8	12	15	4	76	304	7	4	76	304	6	5	12	60	....	....	....	....
53	Saybrook		3	22	15	10	5	10	50	12	5	38	190	15	5	38	190	....	....	....	....
54	Seymour		4	22	27	....	....	....	....	13	5	99	495	7	5	39	195	....	....	....	....
55	Sharon		3	8	24	20	5	78	390	11	5	26	130	6	5	36	180	....	....	....	....
56	Somers		2	5	15	15	5	36	180	15	5	72	360	....	....	....	....	....	....	....	....
57	Southington		4	56	75	13	4	38	152	65	5	76	380	18	5	38	190	....	....	....	....
58	South Windsor		4	16	16	14	5	36	180	8	5	36	180	8	5	72	360	....	....	....	....
59	"	Wapping	3	5	16	5	5	10	50	11	5	36	180	4	5	36	180	....	....	....	....
60	Stafford		4	19	44	19	5	12	60	42	5	48	240	19	5	12	60	....	....	....	....
61	Stamford		4	94	130	34	4	20	80	56	3+	80	280	40	4	40	160	3	3	40	120
62	Stonington	Third	3	9	19	1	3	12	36	25	5	48	240	3	5	36	180	....	....	....	....
63	"	Sixth	2	2	6	....	....	....	....	5	2	72	144	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	24	5	36	180	27	5	72	360	5	5	36	180	....	....	....	....
65	"	Eighteenth	4	5	21	....	....	....	....	16	5	72	360	6	5	36	180	....	....	....	....
66	Stratford		2	3	17	....	....	....	....	20	5	80	400	8	5	40	200	....	....	....	....
67	Thomaston		4	14	26	....	....	....	....	18	5—	46	214	17	5—	50	226	....	....	....	....
68	Torrington		6	82	91	....	....	....	....	124	5—	132	620	22	5	56	280	3	5	24	120
69	Vernon		4	82	100	....	....	....	....	84	5	53	265	80	5	61	305	....	....	....	....
70	Wallingford		4	33	66	10	3	20	60	55	4—	66	258	72	4	74	222	....	....	....	....
71	Waterbury		4	173	214	102	3	40	120	177	3+	80	280	109	5	40	200	....	....	....	....
72	Watertown		4	21	21	23	4	24	96	35	4	72	288	7	4	48	192	....	....	....	....
73	West Hartford		4	15	23	....	....	....	....	27	5	52	260	4	5	37	185	....	....	....	....
74	Wethersfield		2	13	11	12	5	19	95	24	5	41	205	12	5	16	80	....	....	....	....
75	Windham		4	76	85	....	....	....	....	65	3+	60	220	54	4	60	260	9	3	20	60
76	Windsor		4	24	23	10	5	16	80	24	4+	56	260	15	5	36	180	....	....	....	....
77	Woodbury		2	11	21	27	5	24	120	12	5	36	180	....	....	....	....	....	....	....	....
..	Total		....	3089	4068	803	....	....	....	4027	....	....	....	2105	....	....	....	111	....	....	....

TABLE LIV — HISTORY, ETC.

Number	Town	District	Number years in course.	Whole No. Sch'l'rs		History				Civil Government				Political Economy			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. period in courses	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	17	5	40	200	....	....	....	..	....	....	....	....
2	Bethel		3	25	46	29	5	....	....	23	5	12	60	....	....	....	....
3	Branford		3	20	23	40	5	76	380	....	....	....	....	....	....	....	....
4	Bridgeport		4	184	251	330	5—	80	380	....	....	....	....	23	5	20	100
5	Bristol		4	42	60	53	5—	120	560	12	2	40	80	..	....	....	....
6	Canton		4	31	42	47	2	80	160	13	5	20	100	....	....	....	....
7	Chatham		2	9	18	16	4	36	144	11	5	16	80	..	....	....	....
8	Cheshire		3	16	33	17	5	20	100	....	....	....	....	....	....	....	....
9	Colchester		4	28	26	14	4	28	112	....	....	....	....	....	....	....	....
10	Danbury		3	39	91	...	....	....	....	19	5	12	60	....	....	....	....
11	Derby		4	33	33	57	5	50	250	....	....	....	....	....	....	....	....
12	East Hartford		4	30	45	33	5	28	140	14	5	12	60	....	....	....	....
13	East Lyme		2	6	11	17	....	....	....	....	....	....	....	....	....	....	....
14	Enfield		4	40	63	82	3	130	390	10	3+	60	210	10	3	20	60
15	Farmington	Center	1	6	10	....	..	....	....	....	....	....	....	....	....	....	....
16	"	Unionville	4	35	35	65	2+	180	380	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	57	3—	104	240	....	....	....	....	....	....	....	....
18	Groton		4	12	23	....	....	....	....	....	....	....	....	....	....	....	....
19	Guilford		4	13	20	26	5	104	520	3	5	10	50	....	....	....	....
20	Hartford		4	331	442	333	4+	68	245	....	....	....	....	....	....	....	....
21	Huntington	Ferry	4	10	26	....	....	....	....	9	5	48	240	....	....	....	....
22	Killingly	Danielson	4	33	45	33	4	66	264	....	....	....	....	....	....	....	....
23	Litchfield		4	18	21	26	5	114	570	4	5	10	50	....	....	....	....
24	Madison		1	4	5	24	....	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	55	2+	76	190	...	....	....	....	22	5	76	380
26	Meriden		4	88	141	95	5	120	600	30	15	5	75	....	....	....	....
27	Middletown		4	125	106	52	5	114	570	21	5	20	100	....	....	....	....
28	Milford		3	20	34	23	4+	38	171	....	....	....	....	....	....	....	....
29	Naugatuck		4	39	39	28	3+	80	280	5	4	20	80	....	....	....	....
30	New Britain		4	147	176	189	5—	160	720	*...	....	....	....	....	....	....	....
31	New Canaan		2	17	15	43	5	80	400	43	5	60	300	....	....	....	....
32	New Haven	Hillhouse	4	346	459	640	3	160	480	58	4	40	160	....	....	....	....
33	"	Boardman	4	157	100	162	2+	80	200	42	3	....	....	....	....	....	....
34	"	Westville	1	3	7	10	5	40	200	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	26	3	76	228	9	3	38	114	....	....	....	....
36	North Canaan		2	12	14	28	....	....	....	8	3	24	72	....	....	....	....
37	Norwalk	Center	3	12	17	23	5	80	400	....	....	....	....	....	....	....	....
38	"	Over River	4	17	23	10	....	....	....	18	....	....	....	....	....	....	....
39	"	Union	3	24	35	11	5	26	130	6	2	24	48	....	....	....	....
40	"	East	2	6	14	5	3	24	72	....	....	....	....	....	....	....	....
41	Old Lyme		1	4	3	7	5	20	100	....	....	....	....	....	....	....	....
42	Old Saybrook		3	7	13	20	3	114	342	....	....	....	....	....	..	....	....
43	Orange	West Haven	3	23	31	39	3	38	228	11	2	19	38	....	....	....	....
44	"		2	6	6	12	2	76	152	....	....	....	....	....	....	....	....
45	Plainville		3	13	22	30	5	72	360	4	5	12	60	....	....	....	....
46	Plymouth		2	1	10	6	5	22	110	5	5	22	110	....	....	....	....
47	"	Terryville	2	9	7	9	2+	38	95	....	....	....	....	....	....	....	....
48	Portland	Gildersleeve	3	11	9	10	5	80	400	....	....	....	....	....	....	....	....
49	"	No. 2	4	22	17	32	3	80	240	....	....	....	....	....	....	....	....
50	Putnam		4	45	65	69	2+	120	280	15	3	20	60	....	..	....	....
51	Salisbury	Lakeville	3	12	18	29	3	36	108	....	....	....	....	....	....	....	....
52	"	No. 7	3	8	12	14	5	24	120	....	....	....	....	....	....	....	....
53	Saybrook		3	22	15	27	5	51	255	12	5	28	140	10	5	10	50
54	Seymour		4	22	27	29	5	63	315	7	5	12	60	....	....	....	.
55	Sharon		3	8	24	26	5	45	225	...	....	....	....	....	..	....	....
56	Somers		2	5	15	19	5	18	90	19	5	18	90	...	....	....	....
57	Southington		4	56	75	93	4	152	608	6	4	38	152	19	4	38	152
58	South Windsor		4	16	16	22	5	36	180	4	5	36	180	....	....	....	....
59	"	Wapping	3	5	16	16	5	46	230	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	16	3+	108	360	15	2	36	72	...	....	....	....
61	Stamford		4	94	130	136	4+	96	424	75	4	20	80	19	3	20	60
62	Stonington	Third	3	9	19	9	5	84	420	3	5	12	60	....	....	....	....
63	"	Sixth	2	2	6	2	5	36	180	8	5	24	120	....	....	....	....
64	"	Ninth	3	23	34	29	5	60	300	16	5	24	120	...	....	....	....
65	"	Eighteenth	4	5	21	6	5	36	180	8	5	18	90	....	....	....	....
66	Stratford		2	3	17	20	5	80	400	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	32	5	69	345	....	....	....	....	....	....	....	....
68	Torrington		6	82	91	70	5	108	540	16	4	16	64	....	....	....	....
69	Vernon	Rockville	4	82	100	90	3+	66	207	23	4	10	40	....	....	....	....
70	Wallingford	Central	4	33	66	34	4	60	240	18	3	40	120	....	..	....	....
71	Waterbury		4	173	214	86	5	80	400	....	..	....	....	..	....	....	....
72	Watertown		4	21	21	29	3+	96	216	....	....	....	....	....	....	....	....
73	West Hartford		4	15	23	....	....	....	....	7	5	15	75	....	....	....	....
74	Wethersfield		2	13	11	....	....	....	....	....	....	....	....	....	.	....	....
75	Windham		4	76	85	98	3	140	420	72	3	20	60	..	....	....	....
76	Windsor		4	24	23	32	3—	108	288	8	2	26	52	....	....	....	....
77	Woodbury		2	11	21	8	5	36	180	....	..	....	....	....	....	....	....
..	Total			3086	4068	3922	....	....	....	650	....	....	....	103	....	....	....

* Included in History.

TABLE LV — MISCELLANEOUS

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Gymnastics				Drawing				Vocal Music			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	....	....	....	....	....	....	....	....	89	1	160	160
2	Bethel		3	25	46	....	....	....	....	....	....	....	....	....	....	....	....
3	Branford		3	20	23	....	....	....	....	49	1	114	114	49	1	114	114
4	Bridgeport		4	184	251	....	....	....	....	233	1	80	80	....	....	....	....
5	Bristol		4	42	60	....	....	....	....	....	....	....	....	73	2	160	320
6	Canton		4	31	42	....	....	....	....	....	....	....	....	70	....	....	....
7	Chatham		2	9	18	....	....	....	....	16	1	36	36	....	....	....	....
8	Cheshire		3	16	33	....	....	....	....	....	....	....	....	....	....	....	....
9	Colchester		4	28	26	....	....	....	....	....	....	....	....	....	....	....	....
10	Danbury		3	39	91	....	....	....	....	....	....	....	....	....	....	....	....
11	Derby		4	33	33	....	....	....	....	....	....	....	....	66	1	156	156
12	East Hartford		4	30	45	....	....	....	....	....	....	....	....	75	2	152	304
13	East Lyme		2	6	11	....	....	....	....	17	....	....	....	....	....	....	....
14	Enfield		4	40	63	....	....	....	....	....	....	....	....	101	1	160	160
15	Farmington	Center	1	6	10	....	....	....	....	31	1	36	36	31	5	36	180
16	"	Unionville	4	35	35	....	....	....	....	..	....	....	....	70	5	40	200
17	Greenwich	Meeting House	4	24	47	....	....	....	....	74	2	160	320	74	2	160	320
18	Groton		4	12	23	....	....	....	....	35	....	....	....	....	....	....	....
19	Guilford		4	13	20	....	....	....	....	13	3+	76	256	....	....	....	....
20	Hartford		4	331	442	753	3	152	456	183	2	152	304	213	1	152	152
21	Huntington	Ferry	4	10	26	....	....	....	....	36	1	160	160	36	1	160	160
22	Killingly	Danielson	4	33	45	....	....	....	....	78	1	152	152	73	3	152	456
23	Litchfield		4	18	21	....	....	....	....	....	....	....	....	....	....	....	....
24	Madison		1	4	5	....	....	....	....	....	....	....	....	....	....	....	....
25	Manchester		4	51	45	....	....	....	....	....	....	....	....	90	2	152	304
26	Meriden		4	88	141	....	....	....	....	....	....	....	....	225	2	160	320
27	Middletown		4	125	106	....	....	....	....	....	....	....	....	231	2	152	304
28	Milford		3	20	34	....	....	....	....	54	1	114	114	54	3	114	342
29	Naugatuck		4	39	39	....	....	....	....	....	....	....	....	77	1	160	160
30	New Britain		4	147	176	....	....	....	....	163	1+	160	240	276	1	160	160
31	New Canaan		2	17	15	....	....	....	....	26	3	40	120	43	5	80	400
32	New Haven	Hillhouse	4	346	459	....	....	....	....	429	2—	168	280	....	....	....	....
33	"	Boardman	4	157	100	....	....	....	....	*381	5+	120	640	....	....	....	....
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	....	....	....	....	26	2	76	152	26	3	76	228
36	North Canaan		2	12	14	....	....	....	....	....	....	....	....	....	....	....	....
37	Norwalk	Center	3	12	17	....	....	....	....	....	....	....	....	....	....	....	....
38	"	Over River	4	17	23	....	....	....	....	25	1	40	40	25	1	40	40
39	"	Union	3	24	35	....	....	....	....	....	....	....	....	....	....	....	....
40	"	East Norwalk	2	6	14	....	....	....	....	20	1	80	80	....	....	....	....
41	Old Lyme,		1	4	3	....	....	....	....	....	....	....	....	....	....	....	....
42	Old Saybrook		3	7	13	....	....	....	....	....	....	....	....	....	....	....	....
43	Orange	West Haven	3	23	31	....	....	....	....	45	1	76	76	45	1	76	76
44	"		2	6	6	....	....	....	....	12	1	76	76	....	....	....	....
45	Plainville		3	13	22	....	....	....	....	....	....	....	....	35	....	....	....
46	Plymouth		2	1	10	....	....	....	....	....	....	....	....	....	....	....	....
47	"	Terryville	2	9	7	..	....	....	....	....	....	....	....	27	5	38	190
48	Portland	Gildersleeve	3	11	9	....	....	....	....	....	....	....	....	19	1	120	120
49	"	No. 2	4	22	17	....	....	....	....	....	....	....	....	38	2	160	320
50	Putnam		4	45	65	....	....	....	....	....	....	....	....	107	1	160	160
51	Salisbury	Lakeville	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
52	"	No. 7	3	8	12	....	....	....	....	..	....	....	....	....	....	....	....
53	Saybrook		3	22	15	....	....	....	....	....	....	....	....	37	5	114	570
54	Seymour		4	22	27	....	....	....	....	19	1	78	78	19	1	78	78
55	Sharon		3	8	24	....	....	....	....	....	....	....	....	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	....	....	....	....	....	....	....	....
58	South Windsor		4	16	16	....	....	....	....	....	....	....	....	....	....	....	....
59	"	Wapping	3	5	16	21	1	12	12	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	....	....	....	....	....	....	....	....	....	....	....	....
61	Stamford		4	94	130	204	2	160	320	204	1	160	160	204	1	160	160
62	Stonington	Third	3	9	19	....	....	....	....	23	1	108	108	28	5	72	360
63	"	Sixth	2	2	6	....	....	....	....	....	....	....	....	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	....	....	....	....	56	5	144	720
65	"	Eighteenth	4	5	21	....	....	....	....	16	5	72	360	14	5	36	180
66	Stratford		2	3	17	....	....	....	....	20	2	80	160	20	2	80	160
67	Thomaston		4	24	26	....	....	....	....	....	....	....	....	....	....	....	....
68	Torrington		6	82	91	....	....	....	....	....	....	....	....	183	2+	240	560
69	Vernon	Rockville	4	82	100	182	1	152	152	31	1	152	152	117	1	152	152
70	Wallingford	Central	4	33	66	....	....	....	....	21	1	80	80	110	1	160	160
71	Waterbury		4	173	214	....	....	....	....	70	1	40	40	230	1—	40	20
72	Watertown		4	21	21	....	....	....	....	....	....	....	....	....	....	....	....
73	West Hartford		4	15	23	....	....	....	....	....	....	....	....	38	....	....	....
74	Wethersfield		2	13	11	....	....	..	....	....	....	....	....	....	....	....	....
75	Windham		4	76	85	....	....	....	....	99	1	80	80	156	1	160	160
76	Windsor		4	24	23	....	....	....	....	....	....	....	....	47	5	144	720
77	Woodbury		2	11	21	....	....	....	....	....	....	....	....	....	....	....	....
..	Total		....	3077	4050	1160	....	....	....	2449	....	....	....	3597	....	....	....

* Includes both Mechanical and Free Hand classes.

TABLE LV — MISCELLANEOUS — CONTINUED

Number	Town	District	Number years in course	Whole No. Sch'l'rs		Stenography				Bookkeeping				Penmanship			
				Boys	Girls	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course	Number studying	Rec. periods per week	Weeks in course	Rec. periods in course
1	Ansonia		4	31	59	....	....	....	....	....	....	....	....	....	....	....	....
2	Bethel		3	25	46	....	....	....	....	....	....	....	....	....	....	....	....
3	Branford		3	20	23	....	....	....	....	....	....	....	....	....	....	....	....
4	Bridgeport		4	184	251	23	5	40	200	23	5	40	200	65	2	20	40
5	Bristol		4	42	60	....	....	....	....	23	5	50	250	....	....	....	....
6	Canton		4	31	42	....	....	....	....	....	....	....	....	....	....	....	....
7	Chatham		2	9	18	....	....	....	....	16	1	16	16	....	....	....	....
8	Cheshire		3	16	33	....	....	....	..	26	2	40	80	....	....	....	....
9	Colchester		4	28	26	....	....	....	..	12	4	6	24	....	....	....	....
10	Danbury		3	39	91	....	....	....	....	....	....	....	....	....	....	....	....
11	Derby		4	33	33	....	....	....	....	....	....	....	....	....	....	....	....
12	East Hartford		4	30	45	....	....	....	....	....	....	....	....	....	....	....	....
13	East Lyme		2	6	11	....	....	....	....	....	....	....	....	....	....	....	....
14	Enfield		4	40	63	10	1+	120	200	9	3+	70	240	*8	*1	*24	*24
15	Farmington	Center	1	6	10	....	..	....	...	24	7	56	440	*8	*1	*40	*40
16	"	Unionville	4	35	35	....	....	....	....	....	....	....	....	....	....	....	....
17	Greenwich	Meeting House	4	24	47	....	....	....	....	6	5	16	80	....	....	....	....
18	Groton		4	12	23	....	....	....	....	....	....	....	....	....	....	....	....
19	Guilford		4	13	20	....	....	....	....	....	....	....	....	....	....	....	....
20	Hartford		4	331	442	35	3	38	114	60	5	38	190	....	....	....	....
21	Huntington	Ferry	4	10	26	....	....	....	....	....	....	....	....	....	....	....	....
22	Killingly	No. 1, Danielson	4	33	45	....	....	....	....	....	....	....	....	....	....		....
23	Litchfield		4	18	21	....	....	....	....	39	5	132	660	....	....	...	....
24	Madison		1	4	5	....	....	....	....	5	5	8	40	....	....	....	....
25	Manchester		4	51	45	....	....	....	....	....	....	....	....	....	....	....	....
26	Meriden		4	88	141	34	5	80	400	104	4	160	640	....	....	....	...
27	Middletown		4	125	106	....	....	....	....	36	5	38	190	....	....	....	....
28	Milford		3	20	34	....	....	....	....	23	4+	38	171	....	....	....	....
29	Naugatuck		4	39	39	13	2	40	80	13	2	40	80	....	....	....	....
30	New Britain		4	147	176	47	5+	80	420	15	5+	40	220	....	....	....	....
31	New Canaan		2	17	15	....	....	....	....	43	4	30	110	....	....	....	....
32	New Haven	Hillhouse	4	346	459	80	6+	80	520	106	3+	120	400	....	....	....	....
33	"	Boardman	4	157	100	....	....	....	....	...	....	...	....	....	....	....	....
34	"	Westville	1	3	7	....	....	....	....	....	....	....	....	....	....	....	....
35	New Milford		2	11	15	....	....	....	....	....	....	....	....	....	....	....	....
36	North Canaan		2	12	14	....	....	....	....	8	2	12	24	....	....	....	....
37	Norwalk	Center	3	12	17	....	....	....	....	....	....	....	....	....	....	....	....
38	"	Over River	4	17	23	4	....	....	....	....	....	....	....	....	....	....	....
39	"	South Norwalk	3	24	35	....	....	....	....	24	2	24	48	....	....	....	....
40	"	East Norwalk	2	6	14	....	....	....	....	20	3	80	120	....	....	....	....
41	Old Lyme		1	4	3	....	....	....	....	....	....	....	....	....	....	....	...
42	Old Saybrook		3	7	13	....	....	....	....	....	....	....	....	....	....	....	....
43	Orange	West Haven,	3	23	31	....	....	....	....	....	....	....	....	....	....	....	....
44	"		2	6	6	....	....	....	....	....	....	....	....	....	....	....	....
45	Plainville		3	13	22	....	....	....	....	....	....	....	....	....	....	....	....
46	Plymouth		2	1	10	....	....	....	....	....	....	....	....	....	....	....	....
47	"	Terryville	2	9	7	....	....	....	....	9	5	12	60	....	....	....	....
48	Portland	Gildersleeve	3	11	9	....	....	....	....	....	....	....	....	....	....	....	....
49	"	No. 2	4	22	17	....	....	....	....	6	4	80	320	....	....	....	...
50	Putnam		4	45	65	....	....	....	....	....	....	....	....	....	....	..	....
51	Salisbury	Lakeville	....	...	....	....	....	....	....	....	....	....	....	....	....	....	....
52	"	No. 7	3	8	12	....	....	....	....	8	3	24	72	....	....	....	....
53	Saybrook		3	22	15	....	....	....	....	12	5	13	65	....	....	....	....
54	Seymour		4	22	27	....	....	....	....	11	5	....	....	....	....	....	....
55	Sharon		3	8	24	....	....	....	....	....	....	....	....	....	....	....	....
56	Somers		2	5	15	....	....	....	....	....	....	....	....	....	....	....	....
57	Southington		4	56	75	....	....	....	....	27	4	65	260	....	....	....	...
58	South Windsor		4	16	16	....	....	....	....	....	....	....	....	....	....	....	....
59	"	Wapping	3	5	16	....	....	....	....	....	....	....	....	....	....	....	....
60	Stafford		4	19	44	....	....	....	....	11	3	36	108	....	....	....	....
61	Stamford		4	94	130	32	3+	80	280	49	4—	60	220	†37	†5	80	200
62	Stonington	Third	3	9	19	....	....	....	....	19	5	24	120	....	....	....	....
63	"	Sixth	2	2	6	....	....	....	....	3	2	36	72	....	....	....	....
64	"	Ninth	3	23	34	....	....	....	....	....	....	....	....	....	....	....	....
65	"	Eighteenth	4	5	21	....	....	....	....	8	5	12	60	....	....	....	....
66	Stratford		2	3	17	....	....	....	....	....	....	....	....	....	....	....	....
67	Thomaston		4	14	26	....	....	....	....	2	2	15	30	....	....	....	....
68	Torrington		6	82	91	20	5	80	400	19	5	24	120	....	....	....	....
69	Vernon	Rockville	4	82	100	....	....	....	....	....	....	....	....	....	....	....	....
70	Wallingford	Central	4	33	96	10	5	40	80	8	3	20	60	....	....	....	....
71	Waterbury		4	173	214	....	....	....	....	117	5	40	200	....	....	....	....
72	Watertown		4	21	21	....	....	....	....	4	3	36	108	....	....	....	....
73	West Hartford		4	15	23	....	....	....	....	22	....	....	....	....	....	....	....
74	Wethersfield		2	13	11	....	....	....	....	....	....	....	....	....	....	....	....
75	Windham		4	76	85	....	....	....	....	....	....	....	....	....	....	....	....
76	Windsor		4	24	23	....	....	....	....	....	....	10	....	....	....	....	...
77	Woodbury		2	11	21	....	....	....	....	....	....	....	....	....	....	....	....
..	Total		....	3077	4050	308	....	....	....	970	....	....	....	....	....	....	....

* Business practice, correspondence. † Typewriting.

TABLE LVI — MISCELLANEOUS

Subject	Towns	No. studying	Record periods per week	Weeks in course	Recitation Periods in course
Electricity	New Haven Boardman	9	4	40	160
Psychology	Danbury	5	4	12	48
Surveying	New Haven Boardman	12	4	8	32
Domestic Science	Bridgeport	14	5	20	100
	New Haven Boardman	95	3	120	360
	Total	109			
Machine tool work, forging a sheet metal.	New Haven Boardman	60	10	80	800
Dressmaking and Millinery,	New Haven Boardman	95	3	120	360
Carving, modeling Venetian iron work,	New Haven Boardman	95	4	120	480
Commercial Law	Bridgeport	23	5	20	100
	Stamford	12	4	20	80
	Vernon	23	5	76	380
	Total	58			
Commercial Geography	Enfield	8	5	16	80
	Torrington	22	5	20	100
	Total	30			
Mathematical Reviews	Manchester	8	5	26	130
Mechanics	New Haven Boardman	21	5	80	400
Biology	New Britain	11	5	40	200
	New Haven Boardman	14	4	40	160
	Total	25			

State Grant of Tuition Fees

To obtain the tuition fee from the state treasury the following steps are prescribed by the law:

(1) At a meeting regularly called, the board of school visitors must vote "consent" to the attendance of resident applicants at a high school in another town. The vote must indicate, also, the particular high school which the applicant desires to attend.

The following form gives, in terms of the law, the consent of the school visitors or town school committee to the attendance of a child at a non-local high school.

CONSENT OF SCHOOL VISITORS

.....189 .

At a meeting of the Board of School Visitors of the Town of.....held on the..... .....day of....., 1897, it was voted:

That the Board of School Visitors hereby consents to the attendance of..... ....., residing with his parents in the town of.....at the High School, in the town of....., provided that said High School shall be approved by the State Board of Education.

Attest,

.....

Secretary of Board.

(2) If the High School mentioned in the application be approved, a certificate in the following form will be sent:

Hartford,.....189 .

It appears from certificates on file in the office of the State Board of Education that the ..... of the town of..... .....have consented to the attendance of ..... at the .....High School.....

For the purpose of making the consent effectual in the case of the said..... .....the State Board of Education has voted to approve the.....High School for the school year of 1897-8, in accordance with the provisions of Chapter ccxlix of the Acts of 1897.

(3) The boards of school visitors or town school committees, through their secretary, should furnish information to the State Board of Education as to the non-maintenance of a town high school, as follows:

.....189 .

This certifies that the town of.....does not maintain a free public high school.

.....

Secretary of.....

(4) The town clerk should supply a certificate in the following words:

..... 189 .

This certifies that the grand list of the town of.....completed in the month of.....189 , was $.....

....

Town Clerk of the Town of.....

(5) On or before July 1 in each year, the following form of certificate should be sent to the State Board of Education:

This certifies that.....children residing in the town of..... have attended a high school in another town, as follows:

NAMES	Attended High School in	Amount of Tuition Fees Paid by Town
.....	.....	.....
.....	.....	.....

.....

Acting School Visitor.

STATE OF CONNECTICUT,
COUNTY OF.....

On the.....day of.....personally appeared .....acting school visitor of the town of .....and made oath to the truth of the above certificate by him subscribed.

.....

The law is understood to make Thirty Dollars ($30.00) per scholar the limit upon which the state can compute "two-thirds of the aggregate of the sums which have been actually paid by the town for tuition fees."

The following table shows the towns that have received grants of tuition fees. The number of scholars attending in non-local high schools and the amounts paid by the state are also given.

TABLE LVII

Town	Number attending non-local High School	High School approved and attended	Amount paid by State
Andover	1	Willimantic	$20.00
Avon	13	Collinsville	
		Unionville	
		West Hartford	167.97
Beacon Falls	2	Derby	32.50
		Seymour	
Bethany	2	Naugatuck	40.00
Bolton	1	Rockville	8.00
Brookfield	2	Danbury	33.32
Burlington	4	Collinsville	76.50
Chaplin	1	Willimantic	20.00
Chester	6	New Haven	
		Deep River	
		Middletown	94.73
Columbia	1	Willimantic	15.00
Coventry	5	Willimantic	100.00
Durham	1	Middletown	20.00
East Granby	3	Suffield	
		Windsor	46 76
East Haven	1	New Haven	20.00
Ellington	27	Rockville	524.00
Haddam	2	Middletown	
		Deep River	22.10
Harwinton	4	Torrington	68.50
Mansfield	4	Willimantic	80.00
Middlebury	1	Waterbury	12.00
Middlefield	8	Middletown	160.00
Newington	5	Hartford	
		New Britain	100 00
North Haven	7	New Haven	
		Meriden	70.00
Prospect	8	Cheshire	
		Waterbury	
		Naugatuck	149.99
Redding	1	Bridgeport	20.00
Rocky Hill	3	Hartford	
		New Britain	60.00
Scotland	1	Willimantic	20.00
Tolland	7	Rockville	140.00
Trumbull	3	Bridgeport	60.00
Westbrook	2	Saybrook	6.66
Wilton	1	Norwalk	7.20
Woodbridge	6	New Haven	
		Ansonia	
		Westville	90.73
Woodstock	3	Putnam	
		Willimantic	30.00
Total	136		$2,315.96

TABLE LIX — EVENING SCHOOLS

TOWNS	No. of Schools	No. of Sessions	Receipts: Received from State Appropriation	Receipts: Town Treasury	Receipts: Other Sources	Expenses: Total	Expenses: Teachers' Wages	Expenses: Fuel and Incidentals	Expenses: Rent	Expenses: Other Objects	Expenses: Total	Registration: No. under 14	Registration: No. over 14	Registration: Whole No.	Attendance: Av. under 14	Attendance: Av. over 14	Teachers: No. Male	Teachers: No. Female	Teachers: Average Wages Male	Teachers: Average Wages Female	Schools Held: Months	Schools Held: Days	Schools Held: Hours
Ansonia	1	75	$11.93	$126.57	..	$138.50	$102.50	$36.00	.....	.....	$138.50	..	51	51	...	5.33	1	..	$1.50 pr. eve.	.....	Nov.-Mch.	M., Tu., W., Thur., Fri.	7 to 9 P. M.
Bridgeport	2	76	92.25	299.37	..	391.62	326.50	10.12	.....	$55.00	391.62	..	213	213	....	41.00	3	1	1.83 "	$2.00 pr. eve.	Oct.-Feb.	M., Tu., W., Thur., Fri.	7.30 to 9.30 P. M.
Danbury	1	75	38.71	410.93	..	449.64	262.50	12.85	.....	174.29	449.64	..	61	61	....	17.20	1	1	2.00 "	1.50 "	Nov.-Feb.	M., Tu., W., Thur., Fri.	7 to 9 P. M.
Hartford	2	75	405.00	3,274.50	..	3,679.50	2,240.50	399.00	$700.00	340.00	3,679.50	..	862	862	....	180.00	5	9	2.00 "	2.00 "	Nov.-Apr.	M., Tu., W., Thur., Fri.	7 to 9 P. M.
Meriden	1	76	51.75	334.22	..	385.97	204.41	31.56	150.00	.....	385.97	..	215	215	....	23 00	1	2	2.00 "	.50 "	Oct.-Feb.	Mon., Tues., Thur., Fri.	7.15 to 9.15 P. M.
New Britain	1	75	270.59	856.30	..	1,126.89	711.25	224.79	.....	190.85	1,126.89	..	184	184	....	120.26	2	7	1.25 "	1.25 "	Oct.-Mch.	M., Tu., W., Thur., Fri.	7 to 9 P. M
New Haven	7	75	1,334.25	5,127.72	..	6,461.97	4,949.25	950.47	.....	562.25	6,461.97	..	1,794	1,794	....	593.00	40	6	1.93 "	1.54 "	Oct.-Feb.	M., Tu., W., Thur., Fri.	7.15 to 9 15 P. M.
Norwalk	1	75	135.62	1,073.44	..	1,209.06	701.00	508.06	.....	.....	1,209.06	..	188	188	....	60.28	3	3	2.50 "	1.58 "	Nov.-Mch.	M., Tu., W., and Thur.	7.30 to 9.30 P. M.
Norwich	2	86	85.95	372.75	.	458.70	408.70	.....	50.00	.....	458.70	19	131	150	....	38.20	3	1	1.25 "	.90 "	Nov.-Mch.	M., Tu., W., Thur., Fri.	7 to 9 P. M.
Stamford	1	75	33.07	183.73	..	216.80	150.00	66.80	.....	.....	216.80	..	37	37	....	14.70	1	..	2.00 "	.....	Nov.-Mch.	M., Tu., W., Thur., Fri.	7.30 to 9.30 P. M.
Waterbury	2	80	339.05	1,346.10	..	1,685.15	1,496.26	113.89	.....	75.00	1,685.15	..	197	197	...	150.70	3	7	2.00 "	1.87 pr. eve.	Oct.-Mch.	Mon., Tues., Wed., Fri.	7.30 to 9.15 P. M.
Total	21	....	$2,798.17	$13,405.63	..	$16,203.80	$11,552.87	$2,353.54	$900.00	$1,397.39	$16,203.80	19	3,933	3,952	....	1,243.67	63	37	.....	.....	.....	.....	.....

SUMMARY

The following gives a summary of statistics of Evening Schools for the years 1888–99:

TABLE LX — EVENING SCHOOLS

Report of Year	Number of schools	Average number of sessions	Receipts			Expenses					Registration			Attendance		Teachers	
			Received from State appropriation	Town or district treasury	Other sources	Total	Teachers' wages	Fuel and incidentals	Rent	Other objects	Total	Number under 14	Number over 14	Whole number	Average under 14	Average over 14	Male	Female
1888	26	..	$1,434.00	$6,981.75	$661.91	$9,077.56	$6,542.13	$1,379.80	$287.50	$867.98	$9,077.41	64	2,631	2,695	27	956	39	24
1889	33	..	1,284.00	7,281.14	225.00	8,790.14	6,569.22	1,424.31	200.00	596.61	8,790.14	73	2,428	2,501	23	856	37	24
1890	32	..	1,510.50	6,999.09	5.43	8,515.02	6,470.82	1,309.35	215.00	519.85	8,515.02	59	2,952	3,011	18	1,007	40	24
1891	27	..	1,308.75	7,587.52	.....	8,896.27	7,029.41	1,001.48	200.00	665.38	8,896.27	22	2,861	2,883	10	872	39	31
1892	35	..	1,309.05	8,380.20	.....	9,689.25	6,834.47	1,805.71	201.67	847.40	9,689.25	73	3,017	3,090	13.7	871.9	33	35
1893	39	..	1,611.85	11,518.51	30.47	13,180.83	7,642.96	1,364.45	875.00	3,298.42	13,180.83	63	3,343	3,406	11.8	1,138.5	41	65
1894	24	..	1,435.57	11,023.09	.....	12,458.66	6,590.11	1,003.02	1,377.69	3,487.84	12,458.66	71	3,123	3,194	16.0	958.0	32	40
1895	46	..	6,021.87	23,940.25	12.00	29,974.12	20,685.01	4,489.51	2,146.00	2,653.60	29,974.12	57	8,007	8,064	17.19	2,146.09	75	85
1896	35	..	3,370.86	17,882.37	.....	21,253.23	15,048.38	2,787.31	1,355.59	2,088.26	21,279.54	58	5,017	5,075	9.9	1,123.62	59	50
1897	31	..	1,83 .07	14,915.27	... .	16,753.54	11,794.96	2,661.19	1,097.67	1,199.22	16,753.56	20	3,421	3,441	2.78	854.83	49	36
1898	26	..	3,059.34	15,230.74	.....	18,290.08	13,131.21	2,502.01	1,065.00	1,591.86	18,290.08	15	4,256	4,271	5.7	1,360.2	60	50
1899	21	..	2,795.17	13,405.63	.... ..	16,203.80	11,552.87	2,353.54	900.00	1,397.39	16,203.80	19	3,933	3,952	....	1,243.67	63	37

Kindergartens

Table shows the number of Kindergartens in the several years since 1889:

Table LXI

Year	Number Public	Number Children in Public Kindergartens
1889–90	5	628
1890–91	10	1,038
1891–92	15	1,113
1892–93	27	2,765
1893–94	34	3,061
1894–95	39	3,537
1895–96	53	4,257
1896–97	63	5,201
1897–98	63	5,377

TABLE LXII —

	Town or City	District or School	Children					Expenses		
			No. enrolled 1897-8	No. 3 yrs. old and under	No. over 3	Age of youngest child	Age of eldest child	Salaries	Material	Fuel and Incidentals
1	Branford	Center	90	5	85	3	7 y., 6 m.	$850	.....	.....
2	Bristol	Federal Hill	120	5	115	3 y., 4 m.	6 y., 11 m.	960	$40	.....
3		North Side	82	4	78	3 y., 9 m.	7 y., 5 m.	820	.....	.....
4		South Side	185	7	178	3 y., 9 m.	7 y., 2 m.	900	24.95	.....
5	East Hartford	Center	75	....	75	3 y., 6 m.	7	532	.....	.....
6		Second North	78	7	71	3	7	532	15	.....
7	Greenwich	Center	100	2	98	3	6	500	35	.....
8	Hartford	Arsenal	175	15	160	3 y., 4 m.	6	1,900	75	.....
9		Brown	254	....	254	4	6 y., 1 m.	4,400	75	$300
10		Charter Oak	97	4	93	3	7	900	.....	.....
11		Lawrence St.	146	....	146	4	7	2,300	.....	.....
12		Northeast	200	....	200	4	6	.....	....	.....
13		Northwest	42	....	42	3 y., 10 m.	6 y., 8 m.	450	10	.....
14		Parkville	181	....	181	3 y., 6 m.	6	1,525	.....	.....
15		Second North	130	....	130	4	7	2,060	.....	.....
16		South	163	....	163	4	6 y., 8 m.	2,150	125	.....
17		Washington	38	3	35	3 y., 8 m.	5 y., 8 m.	300	.....	.....
18		West Middle	130	....	130	4	6	.....	.....	.....
19		Weth. Ave	52	....	52	4	6	800	150	.....
20	Litchfield	.....	....	....	.....	.....	.....	.....	.....	.....
21	Manchester	Ninth Sch. Dist.	276	50	226	3	6 y., 5 m.	1,275	.....	.....
22	New Britain	Bartlett	72	....	72	4	7 y., 6 m.	440	10	25
23		Burritt	135	....	135	4	6 y., 6 m.	840	.....	.....
24		East Street	90	...	90	4	6	840	.....	.....
25		Lincoln	24	....	24	4 y , 1 m.	5 y., 9 m.	190	.....	.....
26		Monroe St*	36	....	36	4	5 y., 11 m.	120	100	.....
27		Northend	85	....	85	4	6 y., 4 m.	840	.....	.....
28		Rockwell	110	1	109	3 y., 11 m.	7 y., 1 m.	800	.....	.....
29		Smith	88	1	87	3 y., 11 m.	6 y., 7 m.	780	.....	.....
30		State Normal	122	1	121	3	6	1,800	133.36	.....
31	New Haven	Day	54	....	54	4	6	850	.....	.....
32		Dwight	68	....	68	4	6 y., 3 m.	950	.....	.....
33		Fair Street	79	....	79	4	7	1,200	.....	.....
34		Hamilton	92	....	92	4	7 y., 3 m.	1,450	.....	.....
35		Lovell	61	....	61	4	7 y., 3 m.	950	.....	.....
36		Skinner	50	...	50	3 y., 6 m.	7	850	.....	.....
37		Strong	81	....	81	4	6 y., 6 m.	800	.....	.....
38		Winchester	120	....	120	4 y., 10 m.	7	1,400	.....	.....
39		Zunder	....	....	....	.....	.....	.....	.....	.....
40	Norwalk	Center	41	3	38	3 y., 6 m.	7 y., 7 m	650	.....	.....
41		Over River	....	....	....	.....	.....	.....	.....	.....
42		Concord Street	80	....	80	4	7	800	20	.....
43		Franklin	135	4	131	3 y., 1 m.	7	800	.....	.....
44	Norwich	Boswell Ave	65	....	65	4	6	650	.....	.....
45		Broad Street	47	....	47	4	6	700	10	.....
46		Broadway	46	....	46	4	6	750	25	.....
47		Greeneville	71	....	71	4	7	720	25	.....
48		Laurel Hill	36	....	36	4	6	445	.....	.....
49		Wequonnoc	75	....	75	4	6	880	75	50
50	Plymouth	Terryville	57	1	56	2 y., 11 m.	6 y., 1 m.	608	.....	.....
51	Salisbury	.....	....	....	....	.....	.....	.....	.....	.....
52	Stamford	Franklin Street	63	....	63	4	7	552	.....	.....
53		West Stamford	82	....	82	4	7	620	70	.....
54	Wallingford	North Main St.	60	14	46	3	6	850	.....	.....
55		Whittlesey Ave.	81	10	71	3 y., 2 m.	6 y., 11 m.	800	.....	.....
56	West Hartford	Center	29	6	23	3 y., 3 m.	7 y., 1 m.	390	5	.....
57		East	25	2	23	3 y., 7 m.	6	390	.....	.....
58	Winchester	West Winsted	98	2	96	3 y., 6 m.	8	700	45	.....
59	Windham	Natchaug	87	3	84	3	7 y., 8 m.	1,320	50	.....
60		The Oaks	26	4	22	3 y., 1 m.	6	360	5	.....
61		State Normal	144	57	87	2 y., 11 m.	8	1,660	50	.....
62	Windsor	Third	48	4	44	3	7	484	.....	.....
63		Ninth	....	....	....	.....	.....	.....	.....	.....

* Spring term only.

KINDERGARTENS, 1896–7

Sessions		Building			Is there a piano?	Is any primary sch. work done?	Number of Kindergartners?	Name of Principal	
How many each day?	How many hours?	Is there a kind'r bld'g?	When Erected?	Cost.					
2	3½	No	.....	.....	Yes	No	2	Alys Griswold.	1
2	4½	No	.....	.....	Yes	Yes	2	Bertha L. Sheldon.	2
2	3¼	No	.....	.....	Yes	Yes	2	Bessie F. Lobdell.	3
2	4	No	.....	.....	Yes	Yes	2	Grace L. Peck.	4
1	3	Yes	1896	.....	Yes	No	2	Edith L Cook.	5
1	3	No	.....	.....	Yes	No	2	Alice M. Bartlett.	6
2	4¼	No	.....	.....	Yes	No	1	J. Olivia Kirkwood.	7
1	3	Yes	1893	$12,000	Yes	No	5	Anne Burr Wilson.	8
1	3	Yes	1888	16,000	Yes	Yes	7	Kate W. Hutchinson.	9
1	3	No	.....	.....	Yes	.....	2	Mabel F. White.	10
1	3	No	.....	.....	Yes	Yes	5	Eva L. Marshall.	11
1	2½	No	.....	.....	Yes	No	5	Georgia M. Moseley.	12
1	3	No	.....	.....	Yes	No	1	Alice S. Hawkins.	13
1	3	No	.....	..	Yes	No	3	Kate P. Safford.	14
1	3	No	.....	.....	Yes	No	5	Susan E. Towne.	15
1	3	No	.....	.....	Yes	No	5	Mrs. C. L. McMurray.	16
1	2½	No	.....	.....	Yes	No	1	Mary M. Bennett.	17
1	3	Yes	1894	.....	Yes	No	5	Adella M. Woodcock.	18
1	3	No	.....	.....	Yes	No	2	Jennie P. Forbes.	19
.....	.....	.....	.....	.....	.....	.....	.....	.....	20
2	4½	No	.....	.....	Yes	No	2	Georgianna Minor.	21
2	3½	No	.....	.....	Yes	No	2	Minnie E. Meehan.	22
2	3½	No	.....	.....	Yes	No	2	Elizabeth W. Welles.	23
2	3½	No	.....	.....	Yes	No	2	Ella J. Beckley.	24
1	2	No	.. ..	.....	No	No	1	M. Catherine Parker.	25
1	2	No	.....	.....	Yes	No	1	Florence J. Pierce.	26
2	3½	No	.....	.....	Yes	No	2	Mary C. Frink.	27
2	3½	No	.....	.....	Yes	No	3	Maud L. Curtiss.	28
2	3½	No	.....	.....	Yes	No	2	Annah T. L. Parsons.	29
1	2½	No	.....	.....	Yes	No	3	Alice O'Grady.	30
1	2½	No	.....	.....	Yes	No	2	Ellen Hill.	31
1	2½	Yes	1895	3961.13	Yes	No	2	Lottie M. Hall.	32
1	2½	No	.....	.....	Yes	No	3	Margaretta T. Simpson.	33
1	3	No	.....	.....	Yes	No	3	Jessie I. Scranton.	34
1	2½	No	.....	.....	Yes	No	2	Isabel B. Bird.	35
1	2½	No	.....	.....	Yes	No	2	Gertrude A. Woodruff.	36
1	2½	No	.....	.....	Yes	No	2	Katherine M. Langtry.	37
2	4	No	.....	.....	Yes	Yes	3	Emma J. Tuttle.	38
.....	.....	.....	.....	.....	.....	.....	.....	.....	39
1	2½	No	...	.....	Yes	No	2	Katherine E. White.	40
.....	.....	.....	.....	.....	.....	.....	.....	.....	41
2	3½	No	.....	.....	Yes	Yes	2	Edythe S. Gates.	42
2	3¼	No	.. ...	.....	Yes	Yes	2	Sara G. Campbell.	43
1	3	No	.....	.....	Yes	No	2	Susie C. Whittlesey.	44
1	3	No	.....	.....	Yes	No	2	Grace Hall Bowers.	45
1	3	No	.....	.....	Yes	No	2	Lucy B. Stone.	46
2	4¼	No	.....	.....	Yes	No	2	Mabel C. Moore.	47
1	3	No	.....	.....	Yes	No	1	Annie P. Torrance.	48
2	3¾	No	.....	.....	Yes	Yes	2	Lucy A. Hazen.	49
2	4¼	No	.....	.....	Yes	Yes	2	Rosa E. Miller.	50
.....	.....	.....	.....	.....	.....	.....	.....	.....	51
2	3¾	No	.....	.....	Yes	No	2	Mary Lee Howell.	52
2	4	No	.....	.....	No	Yes	2	Eda M. Scott	53
2	3½	No	.....	.....	Yes	Yes	2	Edna Louise Brown.	54
2	4	No	.....	.....	Yes	Yes	2	Leila A. Maltby.	55
1	2½	No	.....	.....	Yes	No	1	Viola A. N. Doolittle.	56
1	2½	No	.....	.....	Yes	No	1	Lucy W. Dunlap.	57
2	5	No	.....	.....	Yes	Yes	3	Louise Fenton.	58
2	4	No	.....	.....	Yes	Yes	3	Catharine L. Houghton.	59
2	3¼	No	.....	.....	No	No	1	Katie Keeney.	60
2	4	No	.....	.....	Yes	No	4	Mrs. Eliza G. Graves.	61
1	3	No	.....	.....	Yes	Yes	2	Maud L. Chamberlin.	62
.....	.....	.....	.....	.....	.....	.....	.....	.....	63

Schools in Temporary Homes

To Mr. Charles D. Hine, *Secretary*, —

Sir : As acting visitor for the schools in the Temporary Homes in Fairfield and Middlesex counties during the year ending June 30, 1898, I have visited these schools often and found them kept in accordance with the laws of the State and conducted well and quite successfully.

The condition of these schools was much the same as described in former reports. The children, in respect to age and natural ability, did not differ much from those found there in former years. These children, especially the brightest of them, do not remain long in the Homes, and their places are filled by new commitments of children whose education has been sadly neglected.

There are, however, some things which offset these hindrances to successful teaching. The children are regular in attendance while in the Homes ; they are not subject to the whims and caprices of parents and their demands for their service. They are not required to attend school when sick, but it is a fact that sickness seldom keeps any from school, except when an epidemic prevails in the Home. Lack of clothing and shoes does not keep any from school, and the weather does not at all affect the attendance.

The schoolrooms in the Fairfield County Home were fully described in a former report. Since then they have not been changed ; but so well have these rooms and the furniture been kept, that they hardly show any effect of three years' use. The sanitary condition is excellent.

Both teachers who were employed during the two former years were employed during the past year, to the entire satisfaction of the visitor and of all parties concerned.

During six weeks of the summer vacation school was kept in the forenoons ; the teachers in charge were those who had been employed during the year, — relieved in part by others. I did not visit this vacation school, but I understand that this plan, which was inaugurated the year before, was very satisfactory to the board of management of the Home. The good effects of this vacation school were apparent at the opening of the regular school in September of the present year.

The teacher who had had charge of the senior department of this school since it was first opened, resigned at the end of the year. She had been an excellent teacher and is worthy of a more advanced position.

The school in the Middlesex County Home was much improved during the year ; two teachers were employed instead of one only, as in former years.

During the fall term the playroom was occupied by the pri-

mary department; but, on the opening of the winter term, a new room was occupied by the senior department, giving the younger children the use of the old schoolroom. The new schoolroom is large enough, and is well furnished. It is well lighted and well warmed with steam, but, unfortunately, no provision was made for ventilation, except by windows. Before the building was commenced I called the attention of the persons in charge to the fact that, according to law, the plans should be approved by the State Board of Education, but I am not aware that the plans were ever submitted.

The teacher in charge of the senior department is well fitted for that position by natural ability and experience. She gave new life to this school. The children showed interest in their school work such as I had never seen here before. They made good progress in their studies, and, in every way, the deportment was pleasing and satisfactory.

During the fall term the teacher of the primary department was the one employed in the school the previous year, and during the other two terms the teacher in charge was one who had formerly had the entire school. Both teachers were faithful, and the children showed good improvement.

The table showing attendance in the Temporary Homes exhibits the changes in these schools and the consequent difficulties in successful teaching. In the Fairfield Home, of 160 children, 53 only remained through the year; and in the Middlesex Home, of 78 children, 45 only remained through the year. These facts alone furnish sufficient reason why schools should be maintained for these children in the Homes rather than that they be sent to the schools of the towns in which the Homes are located.

GILES POTTER.

September, 1898.

MR. CHARLES D. HINE,

Secretary of the State Board of Education, —

SIR: I have continued to visit the Temporary Homes at Preston and Warehouse Point during the past year.

The Hartford County schools at Warehouse Point have been taught during the year by two graduates of the New Haven Normal School. The young ladies had only the experience that they had obtained in the model schools at New Haven. They worked earnestly and intelligently, and the schools made progress. For the first time since these schools have been in the charge of the Board the pupils in the primary room were reduced to a state of order and attention.

The whole number enrolled during the year was 123. Of these only 40 were continued through the year. The average attendance was 69.1. Each child was in school, on an average, 114 days.

The same teacher as last year has been in charge of the New London County Home school at Preston. During the year 73 different children were enrolled, and 21 of these were there during the whole year. The average attendance was 37.2, and the average time that each child remained in the Home was 87.6 days.

The school at Warehouse Point continued for 43 weeks; the school at Preston for 36 weeks. The children at the former were in school about one-fifth more days than the children at the latter school. This does not seem just to the children in the latter school. The children in these homes are so young that only a few of them can assist in the work about the Home. They have nothing to do but play and amuse themselves when they are not in school. There is no danger of overstudy for this class of children, and yet for almost a third of the weeks in the year they have no instruction. Actually, the school at Preston was in session 170 days out of 365, or less than one-half of the time.

The primary room at Warehouse Point has too many children for one teacher to take care of, and there are some in the nursery who should be receiving instruction. At Preston the school has become so large that another teacher is an absolute necessity. There are nearly 60 children registered, and a large part of the teacher's time is used in keeping order.

I would renew for your consideration the suggestions made last year:

1. That an additional teacher be employed in each Home.
2. That there be more school days in the year, by arranging for half-day sessions during the months of July and August.

S. P. WILLARD.

October 1, 1898.

TABLE LXIII—SHOWING ATTENDANCE IN TEMPORARY HOMES.

County.	Location.	Enumerated 1897.	Different Children Registered.	Remaining through the Year.	Average Attendance for the Year	Names of Teachers.
Fairfield,	Norwalk,	84	160	53	84.7	Saidee A. Porsell. Hellena A. Bell.
Middlesex,	Haddam,	54	78	45	60.6	Addie E. Matson. Elsie H. Dickinson.
Hartford,	Warehouse Point,		123	40	69.1	Helen P. Tiffany. Hattie E. Terrill.
New London,	Preston,		73	21	37.2	Jennie L. Harris.

Private Schools.

Since 1888 private schools have made returns. A detailed compilation for 1897–8 will be found on pages 130–133, and a summary for seven years is given below :

TABLE LXIV.

Report of Year	Registered	Average Attendance
1893 . .	22,814	16,236
1894 . .	23,939	16,455
1895 . .	25,965	19,113
1896 . .	25,678	18,986
1897 . .	26,577	19,984
1898 . .	27,352	21,476
1899 . .	29,983	22,581

The following table is compiled from the returns:

TABLE LXV

TOWNS	NAMES OF SCHOOLS	Number of different scholars registered	Number over 16 years of age	Average attendance for the year	Length of school in days	Number of teachers	Number of grades
HARTFORD COUNTY							
Hartford	*St. Joseph's School	930	....	756	172	16	8
	*St. Peter's School	1,056	....	789	190	16	8
	*St. Patrick's School	1,098	10	897	196	19	9
	Huntsinger's Business & Shorthand College	451	433	....	215	8	2
	Hartford Business College	439	392	....	303	9	...
	Woodside Seminary	20	18	20	163	8	2
Berlin	Miss Sarah Royce's School	11	....	10	180	1	3
East Hartford	Mrs. L. R. Harrison's School	15	....	9	185	1	...
	Adelaide Loomis's School	12	...	9	180	1	3
	Rev. Geo. A. Bowman's School	17	13	16	180	2	...
Enfield	*St. Patrick's School	323	2	260	191	7	9
	Shaker School	40	....	40	180	3	...
Farmington	Mrs. Lilian Root's School	7	....	7	80	1	1
Glastonbury	Free Academy	95	22	72	187	3	5
New Britain	*St. Mary's School	1,390	....	1,240	192	22	9
	*St. Matthew's German-American School	107	....	86	205	2	7
Simsbury	McLean Seminary	33	20	29	180	5	5
Suffield	Connecticut Literary Institute	83	25	88	185	5	...
Windsor	Young Ladies' Institute	45	20	42	180	9	...
Windsor Locks	*St. Mary's School	374	2	268	184	6	13
Total	20 Schools	6,546	957	4,638	....	144	...
NEW HAVEN COUNTY							
New Haven	*St. John's Parochial School	512	6	467	198	10	12
	*Sacred Heart Parochial School	900	1	810	200	13	8
	*St. Francis' Parochial School	803	3	636	200	12	8
	Hopkins' Grammar School	84	64	66	173	4	4
	Miss May B. Lyon's Shorthand School	13	13	....	2 evs. week	1	...
	Yale Business College	90	....	45	220	5	...
	Preparatory and Commercial Institute	131	120	50	200	10	...
	Miss Hattie A. Ely's Sh.-h'd Sch.	20	20	....	...	1	...
	Miss Orton's and Miss Nichols' Day School for Girls	35	21	31	175	6	...
	Anderson Normal School of Gymnastics	113	95	90	159	11	6
	The Misses Catlin's School	55	...	53	185	4	8
	Platt's School of Shorthand and Typewriting	8	8	....	....	1	...
	Mrs. Cady's School for Girls	89	31	70	180	9	3
	Gaffey's School of Shorthand and Typewriting	200	200	150	120	2	...
	School for Girls and Boys, 33 Wall Street	26	....	19	168	10	...
	Emma J. Thompson's School	28	....	18	190	2	...
	Miss Alma Leighton's School	41	....	31	200	3	9
	Mary S. Johnston's School	39	8	31	180	4	...
	Mary C. Livermore's School	44	....	28	192	1	...
	*Trinity Parish School	34	....	17	210	1	...
	Miss Carrie M. Chapman's School	37	....	21	200	1	...
	Free Kindergarten, Oak St.	104	....	59	200	5	1
	Free Kindergarten, Lloyd St.	78	....	48	200	4	1
	Childs' Business College	156	154	66	210	4	...
	Gile Grammar School	32	15	....	268	2	...
	Charlotte A. Willard's School	29	3	26	163	4	...
Ansonia	*Sacred Heart School	105	....	24	209	3	8
	Alice E. Hoadley's School	30	....	20	68	2	4
Cheshire	*Episcopal Academy	54	34	52	185	5	4
Branford	Swedish School	54	....	45	40	1	3
Derby	Pope's Shorthand School	30	30	25	260	1	3
	*St. Mary's Parochial School	392	2	296	198	8	8

*Ecclesiastical.

TABLE LXV — CONTINUED

TOWNS	NAMES OF SCHOOLS	Number of different scholars registered	Number over 16 years of age	Average attendance for the year	Length of school in days	Number of teachers	Number of grades
NEW HAVEN COUNTY — *Continued*							
Hamden	Hamden Hall School	16	2	13	174	2	...
Meriden	* St. John's German-English School	220	....	183	200	3	7
	Misses Pink's School	27	....	22	170	2	...
	* St. Rose's Parochial School	932	1	726	197	14	8
	German-American School	75	....	65	200	2	8
	St. Stanislaus' Parochial School	84	....	50	200	2	...
	* St. Laurent's School	326	....	277	200	5	8
	* St. Mary's German-Catholic School	212	....	200	200	3	6
Milford	Miss L. Simpson's School	20	....	13	192	1	...
Naugatuck	Hillside Avenue School	25	....	17	192	1	...
Orange	Miss S. C. Hall's School	7	....	3	190	1	...
Southbury	South Britain Select School	13	2	9	150	1	6
Wallingford	Rosemary Hall	28	22	....	165	8	4
	Choate School	16	2	16	165	6	6
Waterbury	Home School	35	7	21	180	2	...
	* St. Margaret's School	155	70	147	165	20	...
	Waterbury Business University	95	94	50	195	3	...
	* Academy of Notre Dame	198	50	175	192	12	12
	* St. Mary's School	800	....	704	186	15	8
	Waterbury Industrial School	300	6	150	....	33	4
	* St. Ann's School	430	....	390	195	8	...
	Miss May Smith's School	5	....	5	180	1	...
	Gerard School	65	1	60	175	4	8
	Margaret L. White's School	19	....	11	186	1	...
Totals	56 Schools	8,469	1,085	6,601	....	300	...
NEW LONDON COUNTY							
New London	Williams' Memorial Institute	169	110	149	185	9	4
	* St. Mary's Parochial School	365	....	267	181	6	8
	Miss Allender's School	8	....	6	184	1	...
	Maria L. Peabody's School	19	5	8	168	1	...
	The Bulkeley School	112	70	98	190	4	3
	Miss M. F. Peck's School	23	8	....	....	1	...
	Adelaide R. da Silva's School	8	....	7	150	1	...
Norwich	Free Academy	299	....	280	186	14	4
	Norwich Business College	104	48	51	240	5	...
	* St. Patrick's Parochial School	670	4	480	200	11	9
	* Taftville Parochial School	399	5	370	150	7	9
	Miss C. E. Blackman's School	12	....	10	180	3	...
Colchester	Day High School	4	4	4	100	1	...
Groton	Miss Robbie Partridge's School	11	....	8	....	1	...
North Stonington	The Edgar Wheeler School	17	6	13	180	1	...
Old Lyme	"Boxwood"	18	15	18	160	7	...
	Black Hall School	40	26	39	175	6	...
Sprague	* St. Joseph's School	118	....	102	200	2	...
Stonington	* St. Michael's School	328	1	251	187	5	9
	Mystic Valley English & Classical Institute	30	12	23	200	4	4
Waterford	Caroline S. Keney's School	6	1	4	90	1	....
Totals	21 Schools	2,760	315	2,188	....	91	...
FAIRFIELD COUNTY							
Bridgeport	* St. Augustine's School	650	2	620	197	11	9
	* St. Joseph's Academy	266	....	216	195	4	...
	Martin's Business College	100	100	100	260	4	3
	Y. M. C. A. Trade School and Institute	145	125	123	100	10	...

* Ecclesiastical.

TABLE LXV — CONTINUED

TOWNS	NAMES OF SCHOOLS	Number of different scholars registered	Number over 16 years of age	Average attendance for the year	Length of school in days	Number of teachers	Number of grades
FAIRFIELD COUNTY — *Continued*							
Bridgeport	Union Business College	180	180	....	....	4	3
	Park Avenue Institute	53	34	45	195	3	4
	The Grove Street Private School and Kindergarten	44	....	28	190	3	5
	Miss Minnie D. Booth's School	25	....	18	188	2	...
	Miss Fannie A. Smith's School	47	....	35	190	2	...
	The Courtland School	88	19	73	166	7	11
	University School	75	30	68	178	8	10
Danbury	*St. Peter's Parochial School	1,007	2	826	200	17	9
	Fannie I. Foote's School	16	4	9	190	1	...
	Olivia C. Stevens's School	8	....	8	45	1	...
	*German Lutheran School	113	....	93	205	3	...
	Miss Charlotte Wakeman's Sch'l	10	....	10	291	1	...
	Helen A. Washburn's School	44	....	27	198	1	...
Brookfield	Curtis School for Boys	24	....	23	252	6	...
	Wilhelmine Skidmore's School	13	3	8	163	1	3
Easton	Easton Academy	25	12	15	200	1	...
Fairfield	Miss Augusta Smith's School	14	3	12	108	2	...
	Fairfield Academy	30	3	25	165	3	8
Greenwich	*St. Mary's School	188	3	116	186	3	...
	The Misses Corwine's School	18	2	16	....	3	3
	Greenwich Academy	55	10	43	180	7	...
New Canaan	The Maplewood School	26	....	20	188	2	...
	New Canaan Institute	29	13	27	130	2	...
Newtown	Newtown Academy	60	9	40	180	3	...
	*Newtown Parochial School	177	12	120	200	5	18
Norwalk	*St. Mary's Parochial School	475	....	363	182	8	5
	Mrs. M. E. Mead's School	40	14	38	220	9	5
	The Select School	6	...	5	180	1	...
	Norwalk University School	14	4	11	175	4	...
	Miss Baird's Institute	52	17	...	....	12	0
	Norwalk Preparatory School	12	6	12	160	2	9
Redding	Hill Academy	13	5	....	185	1	...
	Dr. Annie M. Reid's School	6	....	....	226	1	3
Stamford	Miss Low's School	70	27	63	160	12	12
	Betts' Academy	39	26	39	180	9	4
	Miss Aiken's School	57	14	50	155	15	4
	Miss Carrie A. Hoyt's School	16	....	11	170	2	...
	Merrill's Business College	152	....	75	200	6	...
	H. M. King's School	50	2	46	170	4	6
	Miss Haff's School	12	....	10	240	2	2
	The Misses Warren's Private School	16	....	16	270	3	3
	*St. John's School	557	....	371	191	10	8
	Anna J. Webb's School	5	....	3	190	1	2
Stratford	Private School & Kindergarten	37	...	23	200	3	...
Westport	Staples' High School	65	8	45	195	4	6
	Mrs. Neil Mitchell's School	20	3	....	135	2	2
Wilton	Wilton Educational Institute	20	14	20	300	3	4
	Wilton Academy	11	4	8	200	1	3
Totals	52 Schools	5,275	710	3,973	....	235	...
WINDHAM COUNTY							
Brooklyn	*Parochial School	40	....	34	220	1	...
Killingly	*St. James's Parochial School	242	8	170	191	4	7
Pomfret	Pomfret School	76	25	76	252	10	6
Putnam	*St. Mary's Parochial School	616	....	500	183	10	...
Thompson	*St. Joseph's School	640	....	399	200	8	...
	*Swedish Lutheran School	74	...	60	60	1	2
Windham	*St. Joseph's Parochial School	877	5	650	210	19	8
Woodstock	Woodstock Academy	56	40	47	188	3	4
Totals	8 Schools	2,621	78	1,936	....	56	...

*Ecclesiastical.

TABLE LXV — CONTINUED

TOWNS	NAMES OF SCHOOLS	Number of different scholars registered	Number over 16 years of age	Average attendance for the year	Length of school in days	Number of teachers	Number of grades
LITCHFIELD COUNTY							
Litchfield	James M. Lee's School	16	16	12	180	1	2
Canaan	The David M. Hunt School	22	10	15	195	2	...
Cornwall	Housatonic Valley Institute	20	15	16	180	2	4
Kent	Katherine M. Hopson's School	25	10	....	180	2	...
New Hartford	*St. Mary's Parochial School	253	1	164	195	4	...
New Milford	Mary C. Wells's School	36	....	21	189	1	...
	The Rectory School	25	8	22	238	4	...
Norfolk	The Robbins' School	28	10	25	176	5	...
Roxbury	Booth Free School	28	16	9	115	1	...
Salisbury	The Hotchkiss School	106	72	100	256	8	4
	Taconic School	38	....	33	149	7	11
	*St. Mary's School	80	1	63	193	2	...
Sharon	Carrie P. Taylor's School	10	....	6	180	1	4
Torrington	*St. Francis' Parochial School	779	....	549	197	11	...
Washington	The Gunnery	61	25	57	212	9	6
	The Ridge	7	5	....	243	2	...
	Upson Seminary	14	5	10	180	2	...
	Fanny P. Brown's School	22	....	....	225	4	...
Watertown	The Taft School	68	44	65	175	7	5
Winchester	*St. Anthony's School	320	4	284	174	7	7
	Gilbert Home	208	1	181	208	4	10
	The Gilbert School	112	51	106	184	7	4
Woodbury	Parker Academy	32	6	21	182	2	...
Totals	23 Schools	2,310	300	1,759	....	95	...
MIDDLESEX COUNTY							
Middletown	*St. John's School	604	1	465	184	10	9
	Middletown Business College	102	102	....	254	4	...
	Miss Alice F. Jackson's School	8	....	6	200	2	2
	The Misses Patten's School	62	14	57	175	5	...
	Anne N. Watrous's School	19	....	12	181	1	...
Clinton	Morgan School	313	66	269	184	12	14
Essex	Pratt High School	16	14	15	184	1	3
Portland	*St. Mary's School	178	....	141	189	4	9
Old Saybrook	Miss F. C. Shepard's School	18	2	18	185	1	...
Totals	9 Schools	1,320	199	983	....	40	...
TOLLAND COUNTY							
Coventry	Fannie Kingsbury's School	8	3	....	180	1	5
Stafford	*St. Edward's School	229	....	157	180	4	8
Vernon	*St. Bernard's School	354	....	275	187	6	8
	*Evangelical Lutheran Trinity School	86	..	67	233	2	...
Willington	Mr. Chas. H. Hobby's School	5	....	4	165	1	1
Totals	5 Schools	682	3	503	....	14	...

*Ecclesiastical.

SUMMARY

COUNTIES	Number of Schools	Number of different scholars registered	Number over 16 years of age	Average attendance for the year	Number of teachers
Hartford	20	6,546	957	4,638	144
New Haven	56	8,469	1,085	6,601	300
New London	21	2,760	315	2,188	91
Fairfield	52	5,275	710	3,973	235
Windham	8	2,621	78	1,936	56
Litchfield	23	2,310	300	1,759	95
Middlesex	9	1,320	199	983	40
Tolland	5	682	3	503	14
The State	194	29,983	3,647	22,581	975

Arbor Day.—The following proclamation was issued in April, 1898:

In obedience to the requirements of the law of the State, I hereby designate Friday, the 29th day of April, 1898, as Arbor Day, to be appropriately observed by the people, and especially by the schools of the State, in planting fruit and ornamental trees, and in exercises calculated to awaken an interest in the object and purposes of the day.

Schoolhouses and Libraries

Summary of Statistics, 1897–8

Number of new schoolhouses built during the year	19
Number of schoolhouses in the state	1,617
Number of schoolhouses reported in poor condition	109
Decrease for the year	20
Number of schools having libraries	743
Number of books in school libraries	146,498
Number of districts drawing state money during the fiscal year	334
Total amount of library money paid to districts in the fiscal year ending September 30, 1898	$6,305.00
Number of public libraries	144
Number of sittings in public schools	151,012

The number of books in school libraries reported in the years 1885 to 1899 is as follows:

1885	28,035	1892	66,903
1886	.....	1893	75,641
1887	43,873	1894	82,128
1888	47,907	1895	101,875
1889	56,819	1896	108,319
1890	57,786	1897	128,860
1891	51,446	1898	136,899
		1899	146,498

The number of school libraries reported in the years 1884–1899 is as follows:

1884	240	1892	383
1885	219	1893	398
1886	262	1894	461
1887	290	1895	484
1888	322	1896	564
1889	377	1897	663
1890	380	1898	688
1891	364	1899	743

SCHOOL LIBRARIES

The following table shows the number of districts drawing, the amount of the annual state grants, and the amount expended by the districts.

TABLE LXVI

Report of year	No. Districts Drawing	Amount Received from State Treasury	Amount Expended
1866	94	$590 00	$635.00
....	..	.....	1,242.12
1867	..	515.00	1,580.71
1868	80	865.00	2,802.93
1869	117	1,730.00	3,898.87
1870	128	1,960.00	5,226.64
1871	139	2,385.00	8,065.20
1872	161	2,345.00	7,458.97
1873	204	2,955.00	7,945.80
1874	183	3,340.00	8,095.73
1875	169	2,450.00	7,668.82
1876	154	2,900.00	8,262.15
1877	132	2,270.00	7,448.72
1878	178	2,985.00	9,543.96
1879	167	3,190.00	7,643.14
1880	195	3,040.00	7,412.54
1881	221	3,005.00	9,446.50
1882	221	4,255.00	9,476 98
1883	188	3,470.00	12,952 57
1884	165	3,090.00	14,968 52
1885	195	3,025.00	13,672 72
1886	185	3,300.00	11,535 05
1887	203	3,525.00	11,061.74
1888	287	5,000.00	13,192.42
1889	242	3,835 00	11,333.72
1890	312	5,890 00	15,331.20
1891	267	4,495.00	16,443.14
1892	294	4,485.00	15,121 33
1893	295	4,960.00	15,426.86
1894	292	6,505.00	15,180.65
1895	383	6,185.00	18,824.55
1896	349	5,820.00	20,402 28
1897	400	7,090.00	22,342.82
1898	404	6,830.00	24,855.79
1899	334	6,305.00	24,984.11

SCHOOL LIBRARIES

The following is a list of books suitable for the beginning of School Libraries :

I

Andrews	Ten boys on the road	Ginn & Co.
Baldwin	Fifty famous stories retold	American Book Co.
Blaisdell	Short stories from English history	Ginn & Co.
Bolton	Girls who became famous	Thos. Y. Crowell & Co.
Brooks	American revolution	The Century Company
"	True story of George Washington	Lothrop Pub. Co.
Champlin	War for the Union	Henry Holt & Co.
Church	Stories from English history	The Macmillan Co.
Coffin	Boys of '76	Harper & Brothers.
"	Building the nation	"
	*Story of Columbus	Educational Pub. Co.
Dodge	Stories of American history	Lee & Shepard
Drake	Making of New England	Chas. Scribner's Sons
Eggleston	Great Americans	American Book Co.
Ellis	History of our country	Lee & Shepard
	*Simple stories from English history, books 1 and 2	Longmans, Green & Co.
	*Stories from English history, book 3	" "
	*Stories and biographies, book 4	" "
Farmer	Boys' book of rulers	Thos. Y. Crowell & Co.
Fiske	War of independence, Riv. Ser., No. 62	Houghton, Mifflin & Co.
Gilman	Making of the nation	Lothrop Pub. Co.
Hale	Boy heroes	" "
Higginson	Young folks history of U. S.	Longmans, Green & Co.
Humphrey	How New England was made	Lothrop Pub. Co.
Johonnot	Ten great events in history	American Book Co.
King, G.	DeSoto and his men in the land of Florida	The Macmillan Co.
	*Story of Lincoln	Educational Pub. Co.
Lummis	Spanish pioneers	A. C. McClurg & Co.
Macomber	Great inventors	Educational Pub. Co.
Moore	Pilgrims and Puritans	Ginn & Co.
Mowry	First steps in the history of our country	Silver, Burdett & Co.
Pratt	Stories of colonial children	Educational Pub. Co.
Sanford	History of Connecticut	S. S. Scranton & Co.
	*Story of Washington	Educational Pub. Co.
Scudder	George Washington, Riv. Ser., No. 75	Houghton, Mifflin & Co.
Taylor	Boys of other countries	G. P. Putnam's Sons

II

Andrews	Each and all	Ginn & Co.
"	Seven little sisters	" "
Ballou	Footprints of travel	" "

* Author not given.

Carpenter	Asia	American Book Co.
"	North America	" "
Chaplin	Little folks of other Islands	Lothrop Pub. Co.
Coe	Our American neighbors	Silver, Burdett & Co.
DuChaillu	Wild life under the equator	Harper & Brothers
Kirby	Aunt Martha's corner cupboard	Thos. Nelson & Sons
"	World by the fireside	" " "
Knox	Boy travelers, Ceylon	Harper & Brothers
"	Boy travelers, Japan	" "
Miller	Little people of Asia	E. P. Dutton & Co.
Pratt	Stories of Australasia	Educational Pub. Co.
"	Stories of China	" "
"	Stories of India	" "
"	Stories of northern Europe	" "
Smith	Our own country	Silver, Burdett & Co.
	*Europe (world at home series)	Thos. Nelson & Sons
	*The world (world at home series)	" " "

III

Craik	Mew mew and bow wow	Maynard, Merrill & Co.
Holbrook	Hiawatha primer	Houghton, Mifflin & Co.
Lang	Cinderella	Longmans, Green & Co.
"	Jack and the beanstalk	" " "
Norton	Heart of oak, Vol. I	D. C. Heath & Co.
"	Heart of oak, Vol. II	" "
Scudder	Fable and folk stories, Riv. Ser., No. 47–48	Houghton, Mifflin & Co.
Swinton	Easy steps for little feet	American Book Co.
Williams	Choice literature, No. 1	Sheldon & Co.

IV

Chase	Stories of industry, Vol. I	Educational Pub. Co.
"	Stories of industry, Vol. II	" "

V

Champlin	Cyclopædia of common things	Henry Holt & Co.
"	Cyclopædia of persons and places	" "
Webster	Dictionary	G. & C. Merriam
	Standard dictionary	Funk & Wagnalls Co.

VI

Æsop	Fables	Educational Pub. Co.
Anderson	Stories, Riv. Ser., No. 49-50	Houghton, Mifflin & Co.
Carroll	Alice in wonderland	Educational Pub. Co.
"	Through the looking glass	" "

Grimm	Household tales, Riv. Ser., No. 107–108	Houghton, Mifflin & Co.
Hale	Peterkin papers	" " "
Hawthorne	Wonder book, Riv. Ser., No. 17–18	" " "
Hoppin	Auton House	" " "
Kingsley	Greek heroes	Ginn & Co.
Lamb	Tales from Shakespeare, Riv. Ser., No. 64, 65, 66	Houghton, Mifflin & Co.
Ruskin	King of the golden river	Ginn & Co.
Warner	My summer in a garden	Houghton, Mifflin & Co.
Yonge	Book of golden deeds	The Macmillan Co.
	Arabian nights, Riv. Ser., No. 117–118	Houghton, Mifflin & Co.

VII

Dodge	Rhymes and jingles	Chas. Scribner's Sons.
Eliot	Poetry for children	Houghton, Mifflin & Co.
Longfellow	Children's hour, Riv. Ser., No. 11	" " "
"	Poems	" " "
Montgomery	Heroic ballads	Ginn & Co.
Stevenson	Child's garden of verse	Chas. Scribner's Sons

VIII

DeFoe	Robinson Crusoe, Riv. Ser., No. 87	Houghton, Mifflin & Co.
Henty	With Lee in Virginia	Chas. Scribner's Sons
"	Under Drake's flag	"
"	With Wolfe in Canada	"
Scott	Quentin Durward	Ginn & Co.
Smith	Young Puritans of Old Hadley	Little, Brown & Co.
"	Young Puritans in King Philips' war	" " "
Stowe	Uncle Tom's cabin, Riv. Ser., No. 88	Houghton, Mifflin & Co.

IX

Allen	Flashlights of nature	Doubleday & McClure
"	Story of the plants	D. Appleton & Co.
Badenoch	Romance of insect world	The Macmillan Co.
Baskett	Story of the birds	D. Appleton & Co.
Beard	Curious homes	" "
Blaisdell	Our bodies and how we live	Ginn & Co.
Blanchan	Bird neighbors	Doubleday & McClure Co.
Boyden	Nature study by months	New Eng. Pub. Co.
Burroughs	Birds and bees, Riv. Ser., No. 28, 36	Houghton, Mifflin & Co
Chase	Buds, stems, and roots	Educational Pub. Co.
"	Stories from animal land	" "
Dana	How to know the wild flowers	Chas. Scribner's Sons
Grant	Our common birds	"
Heilprin	Earth and its story	Silver, Burdett & Co
Holden	The earth and sky	D. Appleton & Co.

Ingersoll	Wild neighbors	The Macmillan Co.
Johonnot	Cats and dogs	American Book Co.
"	Curious flyers and creepers	" "
"	Wings and fins	" "
Kelly	Garden and field	Educational Pub. Co.
"	Our shy neighbors	American Book Co.
Kingsley	Water babies	Educational Pub. Co.
Lange	Handbook of Nature study	The Macmillan Co.
Mace	History of mouthful of bread	Harper & Brothers
Mathews	Familiar flowers of field and garden	D. Appleton & Co.
Shaler	Our continent	Ginn & Co.
Strong	All the year round, spring	Ginn & Co.
Van Dyke	Nature for its own sake	Chas. Scribner's Sons
Weed	Insect life	Ginn & Co.
Wright	Seaside and wayside, Vol. I	D. C. Heath & Co.
"	Seaside and wayside, Vol. II	" "
"	Seaside and wayside, Vol. III	" "

Town Management of Schools

The following table shows the towns which have adopted the town system and the year in which the affirmative vote was taken :

TABLE LXVII

Under District System	Under Town System	Date of Adopting Town System	Under District System	Under Town System	Date of Adopting Town System
Hartford Co.			*New London Co.*		
Hartford	.....	....	.....	New London	1868
Avon	.....	....	Norwich	.....	....
.....	Berlin	1898	Bozrah	.....	...
Bloomfield	.....	....	Colchester	.....	....
Bristol	.....	....	.....	East Lyme	1896
Burlington	.....	....	.....	Franklin	1896
.....	Canton	1897	Griswold	.....	....
East Granby	.....	....	Groton	.....	....
East Hartford	.....	....	Lebanon	.....	....
.....	East Windsor	1895	Ledyard	.....	....
.....	Enfield	1892	Lisbon	.....	....
Farmington	.....	...	Lyme	.....	....
Glastonbury	.....	....	.....	Montville	1898
Granby	.....	....	No. Stonington	.....	....
Hartland	.....	....	.....	Old Lyme	1896
Manchester	.....	....	Preston	.....	....
Marlborough	.....	....	Salem	.....	.. ..
.....	New Britain	1873	Sprague	.....	....
.....	Newington	1897	Stonington	.....	....
.....	Plainville	1869	Voluntown	.....	....
.....	Rocky Hill	1897	.....	Waterford	1898
.....	Simsbury	1896			
.....	Southington	1893	*Fairfield Co.*		
South Windsor	.....	....	.....	Bridgeport	1876
.....	Suffield	1897	Danbury	.....	....
.....	West Hartford	1887	.....	Bethel	1888
Wethersfield	.....	....	Brookfield	.....	....
Windsor	.....	...	Darien	.....	....
.....	Windsor Locks	1866	.....	Easton	1896
			.....	Fairfield	1887
New Haven Co.			Greenwich	.....	....
.....	Ansonia	1890	.....	Huntington	1894
.....	Beacon Falls	1892	Monroe	.....	....
Bethany	.....	....	.....	New Canaan	1893
.....	Branford	1867	New Fairfield	.....	....
.....	Cheshire	1898	Newtown	.....	....
.....	Derby	1893	Norwalk	.....	....
.....	East Haven	1897	Redding	.....	....
Guilford	.....	....	Ridgefield	.....	....
.....	Hamden	1894	Sherman	.....	....
.....	Madison	1889	.....	Stamford	1873
.....	Meriden	1895	.....	Stratford	1897
Middlebury	.....	....	.....	Trumbull	1894
.....	Milford	1875	Weston	.....	....
Naugatuck	.....	....	Westport	.....	....
North Branford	.....	....	Wilton	.....	....
North Haven	.....	....			
Orange	.....	....	*Windham Co.*		
.....	Oxford	1898	.....	Brooklyn	1895
.....	Prospect	....	Ashford	.....	....
.....	Seymour	1868	Canterbury	.....	.. .
Southbury	.....	....	.....	Chaplin	1891
Wallingford	.....	....	Eastford	.....	....
Waterbury	.....	....	Hampton	.....	....
.....	Wolcott	1887	.....	Killingly	1897
.....	Woodbridge	1891	.....	Plainfield	1898

Under District System	Under Town System	Date of Adopting Town System	Under District System	Under Town System	Date of Adopting Town System
Windham Co.— Continued			*Middlesex Co.*		
Pomfret	.....	....	Middletown	.....	....
.....	Putnam	1896	Haddam	.....	....
.....	Scotland	1895	Chatham	.....	....
.....	Sterling	1898	.....	Chester	1895
.....	Thompson	1897	.....	Clinton	1869
.....	Windham	1896	.....	Cromwell	1895
.....	Woodstock	1898	Durham	.....	....
			.....	East Haddam	1898
Litchfield Co.			.....	Essex	1870
.....	Litchfield	1880	.....	Killingworth	1895
Barkhamsted	.....	....	.....	Middlefield	1898
Bethlehem	.....	....	.....	Old Saybrook	1873
Bridgewater	.....	....	.....	Portland	1898
.....	Canaan	1898	.....	Saybrook	1870
Colebrook	.....	....	.....	Westbrook	1894
.....	Cornwall	1896			
.....	Goshen	1897			
.....	Harwinton	1890	*Tolland Co.*		
Kent	.....	....			
Morris	.....	....	.....	Tolland	1898
.....	New Hartford	1897	.....	Andover	1888
.....	New Milford	1893	Bolton	.....	....
Norfolk	.....	....	Columbia	.....	....
.....	No. Canaan	1897	Coventry	.....	....
.....	Plymouth	1898	.....	Ellington	1897
Roxbury	.....	...	Hebron	.....	....
Salisbury	.....	....	Mansfield	.....	....
Sharon	.....	....	.....	Somers	1897
.....	Thomaston	1875	Stafford	.....	....
.....	Torrington	1882	Union	.....	....
Warren	.....	....	Vernon	.....	....
.....	Washington	1892	Willington	.....	....
Watertown	.....	..			
Winchester	.....	....			
.....	Woodbury	1896			

Small Schools

The number of schools showing an average attendance of eight or less for the year is 162, which is ten per cent. of the whole number of schools. An important question is whether some of these schools cannot be united with other schools so as to make better schools.

In considering this we must take into account —

1 Changes in population
2 Changes in valuation of property
3 The cost of schools
4 The difficulty of securing teachers
5 The efficiency of schools
6 Conveyance of children.

1. In many districts the population has shifted, few families remain, and the school is small. The remaining families are remote from the schoolhouse and the roads are bad. These

changes should not deprive children of schooling, nor give them inferior or short schools.

2. The taxable property of many districts has notably decreased, and the small school suffers from the fact that there is no property back of it. While the school expense falls upon the town, the district must maintain the schoolhouse. The schoolhouse falls into decay and is not repaired; often it is the most neglected building in the town.

3. The cost per scholar rises to a figure all out of proportion to the cost in schools of average size.

The following is the showing in one town:

Schools	8
Children enrolled	163
Children enumerated	136
Average daily attendance	80
Largest enumeration in any district	24
Smallest " " "	6
Largest enrollment	28
Smallest	11
Largest daily attendance	13
Smallest	5
Largest cost per pupil in average attendance in any district	$21.89
Smallest	8.52

This illustrates an inefficient and wasteful system. It would be far better to unite these schools into one or two and transport the children.

4. Committees find difficulty in obtaining and retaining good teachers. It is somewhat difficult to allure teachers to these schools by moderate or even by adequate pay. When the sum offered is five or six dollars a week qualified teachers seek more lucrative positions.

5. The school becomes inefficient and continues so until the standard of education becomes low. Never having a good school there is no appreciation of a good school, and those who are determined to educate their children go where there are good schools.

Conveyance of Children

Law. — The law authorizes school visitors to close small schools, and unite them with the schools of adjoining districts.

The expense of transportation when approved by the school visitors must be paid by the town.

The table given on page 145 is a summary of information from the towns which are trying this method of improving schools.

The number of schools closed was eighty-four.

The number of children carried was eight hundred forty-nine.

The cost was approximately $12,000.

Distances. — 1. In most cases the children are conveyed the whole distance. Sometimes they assemble at the old schoolhouse or at a dwelling-house, from which the team starts, picking up all who are on the way.

2. In a few cases, all who live more than a mile or other fixed distance are carried. Generally all who would have attended the closed schools are carried without regard to distance.

Financial. — In a few cases, the town owns the vehicle, and hires and pays the driver.

Often a contract is made. In one case the compensation was determined by the sum paid for carrying the mail over substantially the same route.

In one town a sum per day, depending upon attendance, is paid to parents.

In one town $20 per term for each family or bunch of children is allowed, but deduction is made for absence.

The expense is less than the cost of maintaining schools.

Vehicles. — Where the plan has been longest and most efficiently worked there are covered school teams made comfortable by blankets and rugs.

The drivers ought to be selected with reference to trustworthiness and ability to care for the children. Generally any available person is employed.

Result.—The result has been —

1. To make larger schools, and to promote desirable classification.

2. To make better schools. In some cases the change has been very marked — the consolidated school at once taking a high rank because a good teacher was secured.

3. With one exception the cost has been diminished.

4. In every case the attendance has improved.

5. Unpunctuality is entirely avoided, for the children must reach school on time.

The policy of closing schools and transporting children is not popular at first. When it has been tried and properly managed it has always been approved.

Schools should not be closed and children left to walk unreasonable distances. Certainly it is not furnishing "schooling" to close a school and leave children to find their way to the nearest school, no matter what the distance is.

Good roads have an important connection with the schools. In many places road improvement is precedent and necessary to the improvement of schools.

TABLE LXVIII — CONVEYANCE OF CHILDREN

Town	Number Schools Closed	Number Children Carried	Cost for Year 1897–8	Remarks
Ashford	2	6	$68.00	We pay a family or bunch of children living two or more miles from school $20.00 per full term. Parts of term in proportion. We pay the same whether children are carried or not.
Bozrah	1	2	10.00	
Branford	2	22	325.00	
Bristol	1	9	75c. per day	Very satisfactory arrangement.
Columbia	1	4	60.00	
East Haddam	2	10	177.00	
East Haven	.....	2	15.00	
East Lyme	3	6	167.20	Children who are transported are much more comfortable than those who walk even a short distance, and it costs less than maintaining a school.
Easton	2	10	115.00	It is cheaper for towns and better for the scholars.
East Windsor	3	15	484.00	The plan works well.
Ellington	2	18	292.00	We save $300 yearly, give children better teachers, and have better attendance.
Enfield	5	83	924.75	About one-third were carried during the winter months only. At first very unpopular; now very popular. Better attendance is secured.
Fairfield	2	43	268.00	It results in a great saving to the town.
Farmington	2	20	225.00	
Franklin	1	3	19.00	One term only.
Griswold	3	30	139.50	
Hampton	1	5	20.00	
Harwinton	1	6	105.00	Carried about 1 1-2 miles.
Huntington	1	4	60.00	Winter term.
Killingly	3	20	343.00	Transportation economical to the town. A decided advantage to the children.
Lebanon	2	12	148.00	
Lisbon	3	25	15c. per day per child	The cost last year was about $50 more than when there were schools in all districts.
Litchfield	2	28	$10 per wk.	Transportation is a success.
New Britain	1	20	483.60	Arrangement gives satisfaction to parents and children have a graded school.
New Hartford	1	20	7.50 pr. wk.	
Newington	1	13	1.60 pr. day	Extreme distance 3 miles; save about $90. There is a gain in regular attendance.
North Branford	1	9	126.00	Covered wagon. Distance about 2 1-2 miles.
No. Stonington	2	10	100.00	
Old Saybrook	2	80	260.00	During winter months.
Plainfield	3	9	161.70	
Plainville	1	20	240.00	Plan has worked well and secures much better attendance.
Plymouth	1	8	5.00 pr. wk.	
Redding	1	2	10.00	
Scotland	4	60	577.77	All living more than one mile from schoolhouse are carried.
Simsbury	1	6	1.00 per day	
Southington	1	12	226.07	An excellent plan.
South Windsor	1	6	150.00	
Stafford	2	5	173 75	Children should all be required to meet at some convenient place.
Sterling	2	14	265.00	
Union	1	6	72.00	
Waterford	1	8	190.00	The attendance of these children has been good.
West Hartford	5	70	952.00	In one case town owned and furnished team.
Windham	5	80	1,380.91	
Woodstock	2	8	84.00	
Total	84	849	$11,416.25	

Free Text-Books

For schools we supply building, heat, ventilation, seats and desks, furniture, clocks, physical and chemical apparatus, maps, and libraries, on the ground that the schools are made more efficient and the children benefited. The principle of self-reliance being shelved, and the new one of economy of time and energy being introduced, we must square our action to the latter.

The following are the advantages of free books :

1. There is no loss of time at the beginning of school. The delay of parents in procuring books is universal and proverbial. If text-books are on the desks — the first day means the beginning of school and school work.

2. The school life of children is prolonged. Often the purchase of books as children advance — and books change from year to year — is a serious inroad on small incomes. The higher classes require more books and more costly books. The expense becomes an obstacle, and the children leave school just at the time when the largest benefit is possible.

3. The attendance improves. It would appear that these towns supplying books can justly claim an increase of 10 per cent. in average attendance, due to free books alone.

4. Free books remove any distinction of opportunity between those who can and those who cannot supply what is needed. Books are no longer purchased at public expense for the indigent, but for all.

5. The plan has always been satisfactory. From the few figures available it would appear that the first cost of supplying schools liberally with all necessary books and supplies is about $1.00 per scholar, and that the annual cost thereafter is about 50 cents per scholar.

The time for discussion of the principle of self-reliance on the part of parents has passed. If we tax the people for free roads, free bridges, free music, free baths, and the maintenance of the poor, we cannot stop at schools and libraries.

The following table shows the result of the adoption of free text-books in thirty-five towns and districts:

TABLE LXIX — FREE TEXT-BOOKS

Town	Year	Original Expense	1897–8 Cost of Books	1897–8 Cost of Handl'g Books	Method of Distribution	Remarks
Beacon Falls	....	.....	$100.000	.....	... .	
Chatham	1892	$400.00	311.89	.....	.....	
East Haven	....	.....	176.82	.....	Teachers	
East Windsor	1898	.....	.....	.....	.....	Think the plan will work well.
Ellington	....	205.16	90.00	.....	Acting Visitor	Books have been well used and schools are improving.
Farmington	....	.....	.....	.....		
Greenwich	1892	1,500.00	800.00	$100.00	Requis'n upon Custodian	The system gives satisfaction.
Hartford (South)	1878	.....	1,252.50	.....	Principal	Plan indispensable. Should not care to teach under the old plan.
Htfd. (Brown)	...	.....	1,305.79	.....	Principal	
Hartford (Sec. North)	....	.....	600.00	.....	.....	We like plan very much.
Htfd. (W. Mid.)	....	.....	.....	.....	Principal	We like plan very much.
Litchfield	1886	386.17	200.00	.....	Teachers	Costs about 50 cts. per scholar.
Manchester	....	....	238.95	.....	.....	
Montville (9th)	....	.....	200.00	25.00	Teachers	
Naugatuck	....	.....	2,000.00	.....	Teachers	Free books afford opportunity to teach habits of respect for public property.
New Britain	1896	1,658.54	1,056 55	.....	Superintendent	Stationery but not text-books furnished to high school.
New Canaan	1897	996.88	996.88	25.00	Superintendent	It is a great advantage to teachers as well as pupils to have free text-books. $500 saved to the parents.
New Haven (City)	1890	17,892.17	13,047.08	.....	.....	
New Haven (South)	1890	180.85	23.30	.....	Committee	The plan entirely satisfactory.
New Haven (Westville)	....	.....	329.87	....	Teachers	Life of books averages 3 yrs. Pens, pencils, drawing, writing, and practice paper furnished.
Orange	1893	643.69	1,058.21	.....	.....	
Prospect	....	.....	87.00	.....	Teachers	The advantage is that all the children have books.
Salisbury	....	500.00	400 00	abt. 10%	Teachers	
Scotland	....	172.25	11.40	.....	Teachers	It has helped to improve the school more than anything else.
Seymour	1895	624.94	411.67	.....	Secretary	
Sharon	1895	587.01	185.34	14.20	Acting Visitor	
Sprague	1896	....	35.00	10.00	Acting Visitor	At present only part of books furnished.
Stamford	1897	5,700.00	5,700.00	.....	Superintendent	
Thompson	1898	.....	298.30	10.00	Act'g Sch. Vis.	Free text-books work well.
Vernon	1894	1,800.00	500.00	50.00	.....	
Wallingford	1893	1,801.10	1,098.58	.....	.....	
Washington	....	150.00	110.35	10.00	Teachers	
Waterb'y (Town)	1896	2,117.83	2,000.00	.....	.....	
Waterbury (City)	1896	13,000 00	7,500.00	.....	Superintendent	The only good method.
Willington	1896	161.24	38.96	....	.....	There is no way of having the smaller schools supplied with books except by having the town furnish them.

CONDITION OF SCHOOLS

NORMAL SCHOOLS

In 1883 the annual appropriation was $12,000. In 1884, with the opening of a new building, the sum for maintenance of one school was increased to $17,000, and in 1890 the annual sum available for three schools was $60,000. The sum expended in the year ending September 30, 1897, was $59,000.

In 1883 the number in actual attendance was 65, in 1897 the number was 505. Thus, while the expense has increased fivefold or 500 per cent., the attendance has increased seven and one-half times, or 750 per cent. This is in striking contrast with the common schools where the number in attendance has increased 22 per cent., while the expense has increased 90 per cent.

The three schools have accommodations for 750 students, with 505 in attendance. They furnish a yearly supply of 175 teachers, who have been trained for two years. This supply is not sufficient to fill up the waste (calculated at 11 per cent.) of 3,900 teachers, and one of the most important matters of educational polity is to increase and improve the channels through which teachers are supplied.

The main object of the normal schools is to provide the largest number of persons qualified to become highly skilled teachers in public schools. Obtaining an education and a training for teaching are not indeed incompatible, but they are not identical. It would only be to repeat the dismal mistake which has so long prevailed in public elementary and especially secondary schools, to treat the possessor of a good education as, *ipso facto*, fit for the vocation of school teaching. We have a strong desire to maintain a reasonably high standard of scholarship among teachers, but it would be a plain public misfortune if the normal schools were to dispense with any of their training and practice or to neglect the duty of attesting by actual experience in the schoolroom the fitness of all those who are to be entrusted with the charge of children or to dismiss to an inferior place the practical skill and the art of teaching which have been hitherto distinctive features of our normal schools.

In the reports which have been from time to time published relative to the normal schools there will be found accounts of the practice schools. The student teachers prove themselves worthy of the trust which is placed in them. Mechanical forms of teaching are practically unknown among them. They are soon relieved from the nervous anxiety which arises from critical and official inspection of their acts. They appreciate the importance of daily progress and avoid prepared display of results. They are at liberty to improve their methods of instruction, and to think of the development of their scholars rather than of the reproduction of a certain amount of knowledge. There is originality, freedom, and elasticity, and consequently effective teaching.

There has been under this system a body of teachers created, and that they have learned to teach is generally admitted. They have found their way into the schools, until 1,400 of them are exercising their calling in the State. In estimating their success it must be remembered that there is no supervision, there is some prejudice remaining against a trained teacher, and there occasionally arises the hue and cry of well-intentioned and even intelligent people that education is sufficient and that training is useless.

These institutions are seeking with increasing success to attain a standard of excellence indirectly yet accurately measured by the everyday interest and improvement of the children in the common schools. They turn out year by year a body of serious and devoted teachers, of whom the State may well be proud,— a body of teachers more skilled, more apt to teach and better qualified by accurate knowledge and by personal enthusiasm than ever before.

There is still much to be done. The education of children is likely to undergo very important development. Better teaching than has ever been adopted is yet to be devised and new channels of access to the understanding and the sympathies of children to be discovered. This future is full of promise, but if that promise is not to fail it must be fulfilled, not merely by asserting that education is the sole quality in a teacher's equipment, and thus shifting the immediate demand, but rather by strict attention to securing through the present agencies the results which are distinctly desirable and possible in the public schools.

HIGH SCHOOLS

The law relating to high schools passed at the session of 1897 has been in operation one year. The number attending non-local schools from towns entitled to State grant of tuition fee was 136, and the money paid from the State treasury was $2,315.

This legislation has been successful in every point of view. The smaller towns now possess such opportunities for higher education as partially compensate them for the disadvantages of isolation and small taxable property. It is well known that many who have availed themselves of the State grant would not receive this higher education if there were no such grant.

The 77 high schools in the State, with a registration of 7,039, were maintained at an expense of $321,375.67. This means that upon one-twentieth of the scholars was expended one-sixth of the money.

EVENING SCHOOLS

There were schools last year in eleven towns, with a registration of 3,952, and an attendance of 1,243. Two towns were relieved by the Board from the necessity of opening these schools, and in three towns no school was opened, although the law imposes the obligation upon all towns of ten thousand or more inhabitants.

This Board regrets to report that the evening schools of the State are not in a healthy condition, and do not appear to have much educational influence. All suffered from lack of perseverance on the part of the scholars, and few were saved from premature collapse.

It must be remembered that evening schools essay a difficult task. It needs skill, care, and enthusiasm to guide and retain the interest of scholars who enjoy their liberty and are especially sensitive to counter attractions and amusements. Essentially important as it is in every form of educational work, the personality of the teacher in these schools is almost the sole guarantee for sustained progress. It is injurious and sometimes fatal to employ those who are occupied during the day. They proceed to their duties with vitality impaired, and with other interests uppermost. The classes make calls upon their resources and knowledge, which, after the weariness of a long day's work, are fatal to vigorous teaching.

These schools have a most important part to play. The

statistics of the past few years show that numbers sometimes running into the hundreds in our factory towns are unable to read and to write. School authorities are painfully aware that many leave school at fourteen who have not attended school more than two or three years out of the eight years in which they have nominally been upon the registers. There should be continuation schools in which those whose early opportunities have been small or who for any reason have failed to attend the public schools can continue and round out a fair education.

It is wise and absolutely necessary to introduce the element of carefully planned usefulness into all the work of the evening schools, and much thought should be bestowed upon the classification of scholars and the preparation of lessons. The problem which awaits them is to awaken a desire among those who have passed the compulsory age for further knowledge, and to link this knowledge with their habits of life so that they may be directed to the independent progress which is always possible to those in whom the habit of reading has taken root and to whom the applications of science are familiar. Unless the energy of these schools is directed to special knowledge, depending upon science, and to reading they are likely to have an intermittent and rather useless existence.

COUNTRY SCHOOLS

The number of schools, as will be shown on page 79, has decreased, while the number of departments, or graded schools, has very largely increased.

The schools ungraded and practically independent in methods are gradually disappearing. The local district organization hampers development, and the small economies which the districts must practice prevent the introduction of large plans. The growth of schools is manifest not only in size, but in organization. This organization means that there are closer classification, promotions, more method in study, and some attempt to secure thoroughness and advancement in all the subjects taught.

There were 162 schools averaging 8 or less, and probably 300 did not average 20. Small country schools are not as good as they were formerly, owing to the great difficulty which school officers experience in obtaining and retaining suitable teachers. Sometimes, no doubt, inefficiency is the result of

lack of interest and of parsimony. But even where the management is liberal and sympathetic, the same difficulty is experienced.

It is true that trained teachers enter these schools with reluctance. The difficulty of organization and of teaching is supposed to be very great. Teachers go to a country school full of enthusiasm, and well equipped for teaching, but fail in so organizing the school as to accomplish their ideals. It would be an immense benefit if some of the teachers were trained in country schools, and should ascertain by actual experience how the problem of keeping several classes at work under supervision, and yet without waste of time, can be solved.

The difficulties and trials of school teaching in the country have been magnified and have had a deterrent effect. The old buildings, insufficient apparatus, and an unsympathetic community, are, no doubt, found, yet these are not the inevitable or even the usual accompaniments of country schools. It is misleading to gather together all the worst features of bad schools and present them as the true picture of the average country school.

The organization of the small country school worked by a single teacher is a somewhat difficult, but not insoluble, problem. Most excellent work is sometimes performed in such schools. The teacher who is willing to arrange every day's program out of school, to repair to the schoolhouse early in the morning, and have ready for the children the work which they must do, and allow no time to go to waste, will succeed as thoroughly and completely as in any graded or city school.

The welfare of the country schools is a matter of sovereign importance to the State at large. The country towns will, as in the past, continue to supply the towns and cities with fresh and invigorating power. It is highly desirable, therefore, that the outflow from country schools should possess intelligence and character. Thus the centers of wealth have a direct and definite interest in promoting the efficiency of the country schools. The improvement of these schools will, however, depend upon two things: the personality and training of the teachers, and the liberality and intelligence shown in local management. It is extremely detrimental to the country schools that the trained teachers are drawn into the towns, and the country schools consequently entrusted to an inferior quality of teachers. In order that the country schools may be

efficient they need not be a pale and faded imitation of a city school, but they should be organized and taught by teachers who are trained and able to make the most of the country conditions. There should be for these teachers a preparation which is in every particular as extensive and complete as for those whose duties will lie in the larger towns. In order to secure such teachers there is need not only of a sympathetic interest on the part of those who live in the country, but without doubt those who are responsible for the management and welfare of the country schools must be able to pay higher wages and must consider the union of schools and the conveyance of children.

SCHOOL LIBRARIES

It is gratifying to record an increasing interest in the provision of school libraries, as attested by the fact that the number of libraries increased from 688 to 743 in the year 1897-8. The State contributed to these libraries $6,305, and districts and individuals added $18,679.11. The number of books in these libraries is reported to be 146,498.

We gladly report that in many districts efforts are made to improve the condition of school libraries and thus to early encourage the habit of reading wisely-chosen and useful books. Teachers, school officers, and officers of public libraries are endeavoring to establish a closer connection between the public libraries and the public schools. The effect of the multiplication of school libraries will be healthy increase in the number who will make good use of the advancing system of public libraries. We note and welcome the attempts made by librarians to extend in co-operation with the teachers of public schools this valuable means of education.

If the instruction of our public schools be successful, to what does it lead? In many cases to the reading of the lowest and worst forms of inflammatory literature, the whole tendency of which is bad. Compulsory schooling is less than half a measure if schools do not provide the natural sequel, — a supply of good books. Libraries should be attached to every school and to every school child should be brought at least some of the books which make it worth while to learn to read.

BUILDINGS

It is proper to note the liberal spirit which is exhibited in the amounts expended for schoolhouses. In the nine years ending September 1, 1898, $2,765,449.51 were paid on the completion or enlargement of 128 schoolhouses.

There is considerable margin of school accommodation over the average attendance, but the relations of scholars to buildings are not exactly expressed by statistics, since many buildings are seriously overcrowded, while many others have unoccupied seats. Moreover, the compulsory education law is not in all places fully enforced, and when this enforcement is satisfactory the school population will in some places need still further accommodation.

The quality of school accommodation varies very greatly. Many of the older schoolhouses are single-room buildings, and depend upon windows for ventilation and upon box stoves for heat. In cities, buildings have very largely increased in number, and some are architecturally ornate and luxurious in their appointments.

So far as the fabric and premises of our schools are concerned a higher and more satisfactory level is constantly being reached, both in regard to their equipment for educational work and their sanitary condition.

ATTENDANCE

Since the presentation of the last report, the number of scholars on the registers of public schools has increased from 143,921 to 147,833, an increment of 3,912, as compared with 2,436 in the preceding year. Shown in percentages the number of scholars on the school registers has increased 2.71 per cent., as compared with 1.7 per cent. in the preceding school year. The increase in average attendance has been 3,938, as compared with the previous figures of 4,139, which is an increase of 3.9 per cent., as compared with 4.3 per cent. in the preceding year. The decrease is entirely due to the fact that the appropriation for the compulsory work was decreased, and the Board was compelled to cut off the work of the compelling officers early in the school year.

The compelling officers have performed their duties in an efficient and impartial manner. Where the teaching is interesting and the discipline firm there is little for the compelling officers to do.

The low percentage of average attendance is partially due to the fact that children are not subject to the compulsory attendance law until they are eight years of age. When they reach this age their attendance is reported and inquired into. The compulsory term ought to begin at seven instead of eight.

There should be provision more stringent than the law now contains in the case of those who have passed the age of fourteen. A child passes this compulsory age and then begins to attend in a desultory fashion, knowing perhaps that he is no longer subject to the law. He leaves just at the point where what he has learned is most easily lost or ought, in order to do him the most good, to be carried on and confirmed. His education is cut off at the time when two or three years of additional schooling would be of priceless value, by enabling him to retain and digest what he has learned and developing any literary appetite he may have acquired. Such children soon waste in idleness the effects of seven years of schooling; they sink month by month from all the higher ideals of life until they are swallowed up in the great horde of idlers who infest every town. The influence which the teacher and school has taken several years to acquire is untimely sacrificed.

It will not be right for us to disguise the fact that the labors of the compelling officers whose activity in the discharge of their difficult duties is meritorious sometimes fail to receive at the hands of local prosecuting authorities and others in responsible positions that support which is necessary to the due execution of the law. The reluctance of prosecuting officers and magistrates to enforce penalties on offending parents has much to answer for both in encouraging irregularity and discouraging the zealous endeavors of teachers. The force of the law is rendered nugatory by suspension of judgment to see if attendance will improve or by the imposition of the smallest possible penalty. The fact that a single absence is a breach of the law is not recognized. The administration of the law which too frequently ignores irregularity, provided this irregularity does not amount to more than two or three absences a week, is not of the conquering sort; indeed, it is compulsion reduced to the vanishing point.

The difficulty of enforcing the law as to school attendance springs from nothing more creditable than the strenuous assertion of alleged parental rights or a desire for gain, even at the cost of lasting injury to the intellectual and emotional welfare

of children. Few would seriously maintain that the elementary discipline from eight to fourteen is too much or is enough if the teaching be good. Children are sacrificed to parental selfishness or neglect, not only among those who are needy or unintelligent, but among those from whom on every ground better things might be expected. We can only hope that greed and inordinate idea of parental control which imperil the character and intellectual aptitudes of the children by willfully or negligently detaining them from school will be overcome and dispelled by the pressure of enlightened public opinion and by persistent enforcement of the law.

We cannot but regard the intermittent withdrawal of children from the regular discipline of well ordered school life as deserving constant and close inquiry by the agents into the causes. The State is thereby deprived of much of the advantage which it has a right to expect from the devoted labors of the teachers, and from its immense and growing expenditure on the public schools. The attempts to impart an education to children who are not present or are irregular with great regularity must result in failure, and education cannot be made satisfactory until the great defect has been cured.

EXPENSES

In proportion to the increasing extent of the work accomplished by the schools the amounts voted by the towns and the State continue to rise. The amount expended for the running expenses of schools has risen from $1,144,245.34 in 1880 to $2,159,591.59 in 1898, and the total expenditure from $1,408,374.74 in the former year to $2,986,152.59 in the latter.

In the diagram numbered vi, there will be found a comparison of the cost of maintenance, including teachers' wages, fuel, and incidentals, with the other items of cost. The percentages and not the totals are given. The sums which have been spent on new schoolhouses, alterations, and repairs are included in other curves. With a few exceptions, which were due to special circumstances, the percentage of maintenance as compared with the other items of cost has not increased. More than four-fifths of the total expenditure is for salaries or teachers' wages.

The sum paid for teachers' wages would pay $500 for each teacher, and the impression would be that satisfactory salaries are paid, but examination shows that a few officers and prin-

cipals receive large sums in comparison with the rank and file. In some of the schools the pay of teachers is not more than $5 a week. A teacher must be secured for this sum. In others the salaries range from $7 to $10. The average salary in most of the schools of the State is not more than $8, which is $288 a year for nine months, and there are 378 teachers receiving $25 or less a month.

If a comparison of salaries be made with those of stenographers, bookkeepers, and skilled mechanics on the basis of the hours of work performed, the result is not unfavorable to the public schools. A young woman just graduated from the high school, or perhaps without any graduation from the high school, obtains $8 a week, which is probably more than she can earn in any other occupation, and more than most young men obtain at first. Where can any such person earn as much the first year and work only five days in the week? The foregoing is pertinent only when the unskillful and untrained are employed.

Admitting that no untrained or incompetent teacher should be employed at any price, it must be said that the school teacher has the most influential and responsible position of any public servant, and the amount paid to teachers should be large enough to obtain the trained and skillful, and thus to subserve the interests of the children. It is not mere mechanical skill that is required; it is a high standard of character and education and power to interest and direct children in the right way.

It is often alleged that full value is not received for the money contributed to education by the State, by towns, and by private liberality. If this statement means that we have attained schools efficient in respect of attendance and teaching only in a small minority of cases, and in the case of a large majority of cases only partially efficient schools, and in the case of another minority have made no approach toward efficiency, it is true that in the two latter cases insufficient value is obtained for the large outlay.

Moreover, we do not attain the ideals or aspirations of the people. When children of twelve do not know more than children at ten ought to know, when 30,000 are absent illegally and inexcusably every day, when one-sixth of the money raised by taxation is expended upon one-twentieth of the scholars, we certainly have not reached the highest pitch of true economy.

This statement does not impute any illegal laxity to school officers or teachers. There can be no well-grounded charge of extravagance against school officers, for no school has ever been found in which a good teacher was receiving too large a salary. If inefficient teachers are receiving anything money is wasted, and this is the fault of the system which requires no high and uniform standard of qualification.

The chief problems immediately before us are the gathering of all the children into the schools, the training of skillful teachers, rescuing children from poor teaching by the imposition of a standard of teaching qualification, and a radical reform of high school education.

We have the satisfaction of recording signs of healthy progress. There is greater readiness to recognize deficiencies which exist, and to consider the remedies which abate or remove them. School libraries are rapidly increasing in number and influence, the average attendance slowly improves, the normal schools are sending out skilled teachers, the better system of town management is gaining ground. We conclude that there is time for some congratulation and much reflection, but no time for rest.

CHARLES D. HINE.

STATISTICAL TABLES

The following tables are compiled from the returns which the law requires School Visitors to make to the Board of Education.

By way of explanation it may be said: —

1. The Grand List of each town is taken from the books of the Comptroller's office.

2. The per cent. of taxable property appropriated for public schools is based upon the total amount received for school purposes diminished by the amounts received from school fund, etc., town deposit fund, and local funds.

3. The amount paid for each enumerated scholar is found by dividing the total amount expended, less amount paid for new buildings, by number enumerated.

4. As has been the custom for a number of years past, the number "registered in Winter" is found by combining the number returned for Fall *and* Winter terms, taking the highest number found in either.

5. The "average attendance in Winter" is found in the same manner.

6. The "per cent. who have attended some part of the year" compares the "different scholars" with the "enumeration." The large per cents. attained by some small towns are explained by the attendance of scholars not enumerated.

7. *Regularity of attendance* and efficiency in this direction are indicated by the "per cent. of attendance on basis of registration."

8. The "per cent. of attendance on basis of enumeration" is found by dividing the average attendance for the year by the enumeration.

9. The number who "attended Normal School" is not complete.

10. By "schools" is intended the number of public schools in each town; and

11. By "departments" the number of departments in the public schools, counting each room of a graded school as one department.

12. The Public Libraries mentioned are not all free libraries.

13. The indebtedness incurred on account of schools is probably much larger than the amount reported. In towns where the districts have been consolidated and in some other towns it is made a part of the general indebtedness of the town and is not separately reported to this office.

14. Interest upon school district indebtedness, and expenditures of money for rent of school buildings, are included in the sums used in computing the cost per scholar upon basis of enumeration and also upon basis of average attendance.

STATISTICAL TABLES

HARTFORD COUNTY

TOWNS.	Grand List.	RECEIPTS. School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	Districts Taxing.
Hartford,	$55,322,251	$31,070 25	$1,408 88	.....	$110,242 08	$145,289 78	$2,004 14	$17,122 77	$307,137 90	8
Avon,	464,915	553 50	94 20	$113 96	1,592 70	561 00	5 31	.....	2,920 67	1
Berlin,	1,173,514	1,248 75	147 60	536 69	3,628 65	78 07	5 00	29 30	5,674 06	..
Bloomfield,	721,668	571 50	.....	.....	2,472 55	.....	5 00	80 00	3,129 05	1
Bristol,	3,847,920	4,317 75	223 84	85 39	27,602 57	9,843 72	.....	2,803 43	44,876 70	4
Burlington,	364,775	618 75	198 85	75 40	1,582 84	.....	.....	56 00	2,531 84	..
Canton,	1,151,733	1,480 50	147 63	.....	4,887 62	3,278 66	.....	1,041 68	10,836 09	1
East Granby,	452,533	256 50	93 60	.....	1,235 97	200 00	14 60	.....	1,800 67	1
East Hartford,	2,749,542	3,321 00	287 00	.....	10,865 27	3,667 35	.....	652 79	18,793 41	1
East Windsor,	1,122,947	1,647 00	391 31	44 70	5,741 25	.....	.....	.....	7,824 26	..
Enfield,	2,708,451	3,505 50	294 22	.....	17,200 28	.....	.....	.....	21,000 00	..
Farmington,	1,596,252	1,557 00	244 12	473 00	7,743 11	2,675 61	.....	142 00	12,834 84	2
Glastonbury,	1,660,433	1,777 50	324 73	18 05	5,126 86	388 82	.....	36 75	7,672 71	1
Granby,	381,857	540 00	296 12	.....	1,988 88	307 00	66 30	.....	3,198 30	3
Hartland,	194,631	31 50	.....	.....	1,591 62	.....	.....	.....	1,623 12	..
Manchester,	.....	2,340 00	234 18	.....	11,269 81	4,775 02	.....	.....	18,619 01	3
" Ninth District,	.....	2,628 00	.....	.....	17,278 37	.....	840 91	.....	20,747 28	..
" complete,	4,061,663	4,968 00	234 18	.....	28,548 18	4,775 02	840 91	.....	39,366 29	3
Marlborough,	140,094	103 50	.....	.....	770 50	.....	.....	.....	874 00	..
New Britain,	9,518,799	11,652 75	369 13	.....	72,173 46	.....	.....	5,802 66	89,998 00	..
Newington,	428,376	387 00	60 60	.....	1,088 04	.....	.....	7 98	1,543 62	..
Plainville,	719,232	850 50	.....	.....	4,139 26	.....	.....	.....	4,989 76	..
Rocky Hill,	392,802	508 50	177 19	.....	848 04	.....	5 00	180 86	1,719 59	..
Simsbury,	1,380,165	900 00	148 76	33 12	4,400 18	.....	.....	.....	5,482 06	..
Southington,	2,191,254	2,675 25	276 00	689 25	16,147 41	.....	.....	.....	19,787 91	..
South Windsor,	1,037,143	787 50	243 55	.....	4,071 83	26 14	5 00	97 10	5,231 12	..
Suffield,	1,978,420	1,390 50	411 69	.....	5,066 37	.....	.....	474 58	7,343 14	..
West Hartford,	3,030,170	1,201 50	99 60	25 50	15,897 53	.....	.....	.....	17,224 13	..
Wethersfield,	1,303,840	927 00	107 31	770 00	3,917 37	.....	.....	234 24	5,955 92	..
Windsor,	1,388,534	1,566 00	199 90	.....	7,902 65	3,556 33	23 40	553 10	13,801 38	3
Windsor Locks,	1,523,393	1,685 25	.....	.....	3,358 95	.....	.....	53 00	5,097 20	..
29 Towns.	$103,107,307	$82,100 25	$6,480 01	$2,865 06	$371,832 02	$174,647 50	$2,974 66	$29,368 24	$670,267 74	29

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent. etc.*	Per cent. etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Hartford,	$193,917 07	$14,152 57	$10,943 58	$7,469 10	$10,798 97	$82,305 16	$319,586 45	$1,500 00	$782,940 63	4.96	1.99	$22 36	$39 48
Avon,	2,240 00	194 61	143 21	.....	.....	91 00	2,668 82	91 00	1,000 00	4.64	3.42	10 84	17 67
Berlin,	4,334 20	834 59	206 27	15 00	.....	150 30	5,540 36	95 05	295 00	3.18	3.09	9 98	17 42
Bloomfield,	2,636 62	326 06	.....	57 65	.....	103 72	3,124 05	54 00	.....	3.54	3.42	12 29	20 02
Bristol,	27,169 02	2,295 87	1,740 51	483 57	.....	5,270 65	36,959 62	600 00	65,570 23	10.46	7.17	19 25	25 71
Burlington,	2,277 31	113 98	72 99	58 00	.....	83 05	2,605 33	70 00	.....	4.49	4 33	9 47	15 05
Canton,	8,198 00	920 67	259 56	338 31	.....	193 93	9,910 47	193 93	2,000 00	7.99	4.24	15 06	19 47
East Granby,	1,424 50	118 07	214 60	3 50	.....	40 00	1,800 67	40 00	.....	3.20	2.73	15 79	24 83
East Hartford,	11,956 47	2,193 27	3,164 57	252 00	6,000 00	1,142 17	24,708 48	175 00	14,119 99	5.52	3.95	12 67	18 56
East Windsor,	5,933 03	792 50	318 33	140 00	.....	780 40	7,964 26	120 00	1,200 00	5.11	5.11	10 88	18 05
Enfield,	14,189 82	2,877 09	1,552 29	175 00	.....	2,211 00	21,005 20	292 00	.....	6.35	6.35	13 48	24 71
Farmington,	8,393 76	927 94	1,608 48	129 32	.....	1,172 53	12,232 03	224 80	2,000 00	6 61	4.85	17 67	24.19
Glastonbury,	5,839 25	556 00	68 75	10 00	.....	242 86	6,716 86	226 39	39 00	3.34	3.08	8 50	13 67
Granby,	2,651 00	169 30	307 00	.....	.....	71 00	3,198 30	71 00	600 00	6.18	5.20	13 32	19 68
Hartland,	1,464 00	84 90	.....	.....	.....	74 22	1,623 12	74 22	.....	8.17	8.17	17 64	25 36
Manchester,	10,545 24	1,608 69	100 00	.....	1,000 00	1,690 05	14,943 98	391 93	11,228 31	....	....	13 40	20 49
" 9th District,	15,357 66	3,917 11	518 92	321 99	.....	480 09	20,595 77	158 10	.....	....	....	17 63	21 92
" complete,	25,902 90	5,525 80	618 92	321 99	1,000 00	2,170 14	35,539 75	550 03	11,228 31	8.41	7.02	15 64	21 69
Marlborough,	819 00	31 00	.....	.....	.....	24 00	874 00	24 00	.....	5.49	5.49	11 35	18 79
New Britain,	46,131 59	4,417 15	1,176 66	595 89	17,676 64	20,000 32	89,998 25	2,500 00	.....	8.19	7.58	13 96	22 30
Newington,	1,280 00	170 38	34 37	20 00	.....	45 00	1,549 75	45 00	259 53	2.55	2.53	9 01	14 55
Plainville,	4,390 66	490 60	68 73	39 77	.....	.....	4,989 76	72 00	.....	5.75	5.75	13 20	17 53
Rocky Hill,	1,361 05	119 99	193 40	5 00	.....	40 15	1,719 59	34 00	150 00	2.63	2.15	7 60	12 23
Simsbury,	3,529 94	558 90	1,051 19	.....	.....	342 00	5,482 03	300 00	.....	3.18	3.18	13 70	20 37
Southington,	14,225 00	2,683 59	1,684 27	100 00	.....	1,195 05	19,887 91	149 50	.....	7.36	7.36	16 72	22 72
South Windsor,	4,476 01	411 51	28 64	133 47	.....	181 49	5,231 12	121 08	886 18	4.04	3.92	14 94	21 79
Suffield,	5,721 91	1,012 65	238 44	17 06	.....	335 92	7,325 98	229 87	3,592 72	2.80	2.56	11 85	20 15
West Hartford,	9,097 00	627 66	857 41	84 26	566 75	5,991 05	17,224 13	833 30	.....	5.24	5.24	31 19	39 75
Wethersfield,	4,476 70	1,089 05	99 67	95 00	.....	195 50	5,955 92	50 00	450 00	3.18	3.00	14 45	20 15
Windsor,	7,900 74	1,560 91	1,789 13	144 64	.....	1,198 20	12,593 62	174 00	18,960 00	8.66	5.68	18 09	27 40
Windsor Locks,	3,696 00	296 50	81 42	53 00	.....	917 28	5,044 20	30 00	.....	2.10	2.06	6 73	28 82
29 Towns.	$425,632 55	$45,553 11	$28,522 39	$10,741 53	$36,042 36	$126,568 09	$673,060 03	$8,940 17	$905,291 59	5.61	3.60	$17 40	$28 06

* Of taxable property appropriated for Public Schools, in mills and 100ths.
† Of taxable property appropriated for Public Schools by town tax, in mills and 100ths.

NEW HAVEN COUNTY

TOWNS.	Grand List.	RECEIPTS. School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	Districts Taxing.
New Haven City,	.....	8,708 00	$1,222 23	.....	$57,405 62	$283,992 63	.....	$182,047 13	$573,375 61	1
" Westville,	.....	1,100 25	27 60	.....	1,654 19	11,433 32	.....	1,116 65	15,332 01	1
" South,	.....	155 25	3 90	.....	182 97	427 73	.....	.....	769 85	1
" complete,	$58,885,305	49,963 50	1,253 73	.....	59,242 78	295,853 68	.....	183,163 78	589,477 47	3
Ansonia,	3,245,871	6,302 25	.....	.....	25,025 95	.....	.....	39 00	31,367 20	..
Beacon Falls,	218,960	182 25	90 22	.....	787 98	.....	.....	.....	1,060 45	..
Bethany,	375,729	261 00	76 52	.....	1,248 23	1,000 00	.....	.....	2,585 75	1
Branford,	2,021,471	2,432 25	159 23	$28 56	20,840 68	.....	.....	126 45	23,587 17	..
Cheshire,	960,946	699 75	28 00	.....	4,800 91	.....	.....	.....	5,528 66	..
Derby,	4,811,385	3,701 25	.....	.....	11,298 75	.....	.....	130 00	15,130 00	..
East Haven,	715,880	528 75	28 57	.....	2,135 23	3,022 86	.....	152 00	5,867 41	1
Guilford,	1,347,493	1,266 75	.....	.....	5,321 84	.....	10 00	700 90	7,299 49	..
Hamden,	1,846,023	2,067 75	.....	.....	8,540 71	.....	.....	.....	10,608 46	..
Madison,	848,775	679 50	242 76	.....	3,784 27	.....	.....	.....	4,706 53	..
Meriden,	13,755,296	14,136 75	159 44	.....	63,057 66	.....	.....	321 75	77,675 60	..
Middlebury,	473,719	330 75	126 00	.....	870 25	.....	.....	28 50	1,355 50	..
Milford,	1,602,176	1,698 75	4 25	.....	5,858 04	.....	.....	.....	7,561 04	..
Naugatuck,	7,391,323	4,837 50	.....	.....	23,245 57	12,814 32	.....	118 97	41,016 36	1
North Branford,	435,897	416 25	84 14	19 76	1,803 09	.....	.....	.....	2,323 24	..
North Haven,	821,269	807 75	197 53	37 50	2,917 82	2,028 23	10 20	213 22	6,212 25	1
Orange,	3,148,323	3,213 00	15 33	.....	15,556 56	6,920 66	.....	301 16	26,006 71	1
Oxford,	323,809	483 75	.....	22 90	2,051 85	2,060 00	60 00	26 00	4,704 50	2
Prospect,	165,480	229 50	98 83	.....	.....	637 16	.....	.....	965 49	1
Seymour,	1,312,872	1,692 00	73 04	8 00	7,757 43	.....	.....	.....	9,530 47	..
Southbury,	528,250	526 50	119 97	.....	1,722 38	520 25	38 30	5 00	2,932 40	1
Wallingford,	3,529,634	4,380 75	.....	.....	13,890 61	18,045 18	.....	330 66	36,647 20	2
Waterbury,	.....	2,776 50	130 76	40 80	7,103 88	4,440 28	.....	400 00	14,892 22	5
" Center,	.....	22,538 25	.....	.....	.....	114,789 55	.....	236 80	137,564 60	1
" complete,	12,555,193	25,314 75	130 76	40 80	7,103 88	119,229 83	.....	636 80	152,456 82	6
Wolcott,	217,855	310 50	129 90	500 67	837 01	.....	.....	.....	1,778 08	..
Woodbridge,	495,101	447 75	124 69	9 44	1,676 27	.....	30 00	30 00	2,318 15	..
26 Towns.	$122,034,035	126,911 25	3,142 91	667 63	291,375 75	462,132 17	148 50	186,324 19	1,070,702 40	20

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent. etc.*	Per cent. etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries & Apparatus.	New Buildings.	Other Objects.	Total.						
New Haven City,	$272,038 77	$64,035 25	$16,390 19	$2,535 05	$100,098 67	$54,187 27	$509,285 20	$3,800 00	$887,820 30	....	....	$18 90	$31 52
" Westville,	5,569 26	3,088 18	72 58	40 00	5,206 66	5,050 04	19,026 72	100 00	8,000 00	....	....	28 26	41 94
" South,	564 00	100 50	34 36	.....	.....	28 46	727 32	16 00	.....	....	....	10 52	17 52
" complete,	278,172 03	67,223 93	16,497 13	2,575 05	105,305 33	59,265 77	529,039 24	3,916 00	895,820 30	9.14	1.00	19 08	31 73
Ansonia,	22,326 68	2,031 21	1,782 20	304 15	.....	4,922 96	31,367 20	1,854 00	.....	7.72	7.71	11 19	16 41
Beacon Falls,	768 00	122 68	35 02	.....	.....	134 75	1,060 45	24 00	.....	3.59	3.59	13 09	23 82
Bethany,	1,397 49	118 26	.....	25 00	1,000 00	45 00	2,585 75	45 00	.....	5.98	3.32	13 67	21 87
Branford,	9,640 53	1,142 45	2,668 51	382 43	8,538 10	1,215 15	23,587 17	100 00	.....	10.37	10.30	13 92	20 46
Cheshire,	4,648 75	506 66	293 25	.....	.....	100 00	5,548 66	100 00	.....	4.99	4.99	17 84	25 35
Derby,	11,634 75	1,363 84	487 58	.....	.....	981 15	14,467 32	1,500 00	.....	2.34	2.34	8 79	23 24
East Haven,	1,958 31	340 59	281 73	50 00	.....	538 68	3,169 31	16 00	5,000 00	7.41	2.98	13 48	26 19
Guilford,	5,916 00	866 44	268 47	132 27	.....	317 29	7,500 47	127 00	2,800 00	4.47	3.94	13 32	21 89
Hamden,	7,433 15	707 62	623 57	70 00	1,307 22	466 90	10,608 46	411 75	.....	4.62	4.62	10 12	17 75
Madison,	3,452 28	663 18	111 27	.....	386 85	93 95	4,707 53	93 95	.....	4.45	4.45	14 30	20 13
Meriden,	57,597 60	9,094 63	2,276 08	540 00	.....	8,167 00	77,675 31	2,200 00	48,376 19	4.60	4.58	12 36	24 53
Middlebury,	1,226 00	95 73	290 00	10 40	1,000 00	42 00	2,664 13	42 00	1,000 00	1.89	1.83	11 32	19 81
Milford,	6,266 11	836 21	338 72	120 00	.....	.....	7,561 04	79 00	.....	3.65	3.65	10 01	17 12
Naugatuck,	25,452 02	3,065 25	570 48	196 05	11,782 23	10,628 35	51,694 38	202 80	46,483 50	4.89	3.14	18 56	26 56
North Branford,	1,956 93	195 16	8 45	.....	.....	163 00	2,323 54	37 00	.....	4.13	4.13	12 55	23 00
North Haven,	3,298 91	400 89	177 87	70 00	.....	351 35	4,299 02	66 50	561 25	6.29	3.55	11 97	18 93
Orange,	15,443 40	2,944 29	1,101 32	142 99	.....	2,988 41	22,620 41	87 50	46,610 00	7.23	4.94	15 84	24 44
Oxford,	2,314 07	160 43	550 00	28 00	1,560 00	100 00	4,712 50	100 00	1,400 00	12.96	6.33	14 66	30 16
Prospect,	774 00	38 43	35 00	.....	.....	118 06	965 49	18 00	.....	3.85	3.85	9 46	15 69
Seymour,	8,106 98	528 48	303 51	77 10	.....	514 40	9,530 47	84 00	30,000 00	5.90	5.90	12 67	19 27
Southbury,	2,102 90	187 19	553 55	10 00	.....	78 76	2,932 40	78 76	.....	4.32	3.26	12 53	24 03
Wallingford,	23,859 12	4,178 79	2,627 88	148 57	8,631 84	8,167 83	47,614 03	410 00	95,781 28	9.14	3.93	20 02	27 83
Waterbury,	9,589 00	1,741 29	1,804 26	.....	8,183 96	2,393 85	23,712 36	576 00	20,554 24	....	....	12 58	22 73
" Centre,	106,661 94	6,977 79	5,941 35	322 34	76,441 32	41,670 67	238,015 41	3,550 00	300,000 00	....	....	16 12	34 90
" complete,	116,250 94	8,719 08	7,745 61	322 34	84,625 28	44,064 52	261,727 77	4,126 00	320,554 24	11.11	0.56	15 74	33 34
Wolcott,	1,152 00	87 50	538 58	.....	.....	.....	1,778 08	30 00	.....	3.84	3.84	12 88	22 65
Woodbridge,	1,851 69	167 21	152 99	60 00	.....	86 26	2,318 15	36 00	.....	3.50	3.38	11 64	21 17
26 Towns.	$615,000 64	105,786 13	40,318 77	5,264 35	224,136 85	143,551 54	1,134,058 28	15,785 26	1,494,386 76	7.70	2.38	16 13	28 18

* Of taxable property appropriated for Public Schools, in mills and tooths.
† Of taxable property appropriated for Public Schools by town tax, in mills and tooths.

NEW LONDON COUNTY

TOWNS.	Grand List.	RECEIPTS. School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	Districts Taxing.
New London,	$9,249,518	$6,927 75	$464 40	$74 60	$33,500 00	.....	.....	$530 00	$41,496 75	..
Norwich Town,	.....	544 50	36 82	.....	508 68	$3,087 00	$94 00	120 00	4,391 00	1
" Central,	.....	3,224 25	218 00	.....	3,133 12	24,108 20	.....	5,093 23	35,776 80	1
" West Chelsea,	.....	2,479 50	167 65	.....	2,403 57	7,986 42	.....	292 00	13,329 14	1
" Falls District,	.....	616 50	41 68	.....	668 22	1,852 83	.....	1 20	3,180 43	1
" other Districts,	.....	4,938 75	333 93	.....	6,789 50	14,513 32	.....	224 70	26,800 20	4
" complete,	13,756,831	11,803 50	798 08	.....	13,503 09	51,547 77	94 00	5,731 13	83,477 57	8
Bozrah,	453,851	357 75	.....	.....	1,049 50	.....	.....	.....	1,407 25	..
Colchester,	933,672	1,017 00	205 96	49 50	4,249 42	25 00	10 00	10 00	5,566 88	..
East Lyme,	717,445	753 75	.....	.....	4,707 00	.....	.....	.....	5,460 75	..
Franklin,	286,973	234 00	127 48	127 75	1,180 81	.....	.....	.....	1,670 04	..
Griswold,	1,622,075	1,986 75	.....	25 40	7,768 30	1,800 28	.....	.....	11,580 73	2
Groton,	1,914,980	2,452 50	410 36	.....	7,529 80	.....	75 00	130 54	10,598 20	1
Lebanon,	851,569	697 50	395 36	114 97	2,770 77	.....	.....	.....	3,978 60	..
Ledyard,	380,037	614 25	285 40	54 58	1,702 32	.....	.....	63 00	2,719 55	..
Lisbon,	235,264	265 50	.....	.....	400 50	.....	.....	.....	666 00	..
Lyme,	279,562	326 25	222 93	.....	717 82	.....	.....	.....	1,267 00	..
Montville,	997,098	1,271 25	.....	.....	3,784 58	293 29	54 00	558 00	5,961 12	1
North Stonington,	487,400	668 25	407 78	.....	2,161 37	75 30	12 00	51 50	3,376 20	2
Old Lyme,	447,299	470 25	244 84	.....	2,128 58	.....	.....	40 00	2,883 67	..
Preston,	870,778	1,505 25	298 16	61 70	3,315 37	818 82	.....	.....	5,999 30	4
Salem,	175,692	267 75	123 15	20 40	819 90	54 90	8 00	40 40	1,334 50	..
Sprague,	551,317	837 00	154 05	.....	882 89	.....	.....	.....	1,873 94	..
Stonington,	2,771,793	3,818 25	524 09	.....	11,826 04	5,697 05	91 45	1,617 69	23,574 57	3
Voluntown,	239,369	452 25	200 95	.....	1,613 79	.....	.....	.....	2,266 99	..
Waterford,	1,105,072	1,518 75	.....	.....	2,864 59	.....	.....	48 25	4,431 59	..
21 Towns.	$38,327,595	$38,245 50	$4,862 99	$528 90	$108,476 44	$60,312 41	$344 45	$8,820 51	$221,591 20	21

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent. etc.*	Per cent. etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
New London,.....	$28,136 75	$2,899 95	$2,620 57	$1,227 43	.....	$6,209 47	$41,094 17	$400 00	.....	3.67	3.62	$13 34	$23 05
Norwich Town,....	2,491 00	925 00	88 00	185 00	.....	702 00	4,391 00	.....	$6,000 00	....	....	18 14	24 66
" Central,.....	21,836 25	2,704 68	1,121 50	250 00	$9,513 62	4,422 25	39,848 30	2,500 00	90,000 00	....	..	21 16	33 63
" West Chelsea,..	9,202 40	715 99	707 51	110 32	7,867 68	2,622 58	21,226 48	.....	16,000 00	....	....	12 12	19 53
" Falls District,..	2,675 00	421 29	174 67	.....	.....	1,368 02	4,638 98	.....	5,200 00	....	....	16 93	44 39
" other Districts,	16,048 22	2,780 82	1,403 68	135 40	.....	2,512 00	22,880 12	500 00	.....	....	...	10 42	31 68
" complete,.....	52,252 87	7,547 78	3,495 36	680 72	17,381 30	11,626 85	92,984 88	3,000 00	117,200 00	5.15	0.98	14 41	29 18
Bozrah,.....	1,233 00	101 00	.....	.....	.....	73 25	1,407 25	73 25	.....	2.31	2.31	8 85	14 73
Colchester,.....	4,844 38	759 89	.....	30 00	....	91 00	5,725 27	91 00	131 00	4.59	4.55	12 28	20 15
East Lyme,.....	3,823 00	236 32	361 26	257 91	575 61	206 65	5,460 75	64 00	... .	6.56	6.56	14 58	20 96
Franklin,.....	1,440 00	71 35	32 69	.....	.....	126 00	1,670 04	77 00	.....	4.11	4.11	16 05	26 93
Griswold,.....	8,619 43	1,227 56	147 96	70 00	27,000 00	313 75	37,378 70	313 75	27,000 00	5.89	4.78	11 75	17 98
Groton,.....	9,610 03	1,077 84	291 41	225 17	2,000 00	582 80	13,787 25	219 40	5,809 00	4.04	3.93	10 81	16 54
Lebanon,.....	3,610 55	250 80	.....	.....	.....	109 00	3,976 35	109 00	... .	3.25	3.25	12 82	19 53
Ledyard,.....	2,495 49	125 06	.....	.....	.....	100 00	2,720 55	100 00	.....	4.64	4.47	9 96	13 88
Lisbon,...	640 00	10 00	.....	.....	.....	16 00	666 00	16 00	.....	1.70	1.70	5 64	10 57
Lyme,.....	1,143 45	80 55	.....	.....	.....	42 00	1,266 00	42 00	.....	2.56	2.56	8 73	15 07
Montville,.....	5,018 65	290 36	57 06	.....	.....	421 48	5,787 55	134 75	.....	4.70	3.79	10 24	15 27
North Stonington,...	3,012 09	137 23	75 30	21 50	.....	130 08	3,376 20	130 08	.....	4.71	4.43	11 36	17 58
Old Lyme,.....	2,395 00	231 43	122 75	60 24	.....	74 25	2,883 67	74 25	.....	4.84	4.75	13 79	19 16
Preston,.....	4,795 68	316 07	168 64	.....	.....	466 79	5,747 18	135 79	2,050 00	4.74	3.80	8 58	16 42
Salem, ...	1,154 55	45 00	70 58	40 31	.....	33 00	1,343 44	33 00	1,500 00	5.25	4.66	11 28	17 67
Sprague,.....	1,462 79	331 15	200 00	.....	.....	80 00	2,073 94	80 00	525 00	1.60	1.60	5 57	12 14
Stonington,.....	14,469 09	2,003 75	699 85	273 37	.....	1,337 91	18,783 97	352 69	34,026 50	6.93	4.26	11 06	19 46
Voluntown,.....	2,109 89	103 90	.....	20 00	.....	62 20	2,295 99	52 20	334 00	6.74	6.74	11 42	19 29
Waterford, ...	3,942 92	374 36	40 62	.....	.....	197 63	4,555 53	117 00	1,337 00	2.63	2.59	6 74	14 14
21 Towns.	$156,209 61	$18,227 35	$8,384 05	$2,906 65	$46,956 91	$22,300 11	$254,984 68	$5,615 16	$189,912 50	4.64	2.83	$12 22	$21 65

* Of taxable property appropriated for Public Schools, in mills and rooths.
† Of taxable property appropriated for Public Schools by town tax, in mills and rooths.

FAIRFIELD COUNTY

TOWNS.	Grand List.	RECEIPTS.								Districts Taxing.
		School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	
Bridgeport,	$57,539,225	$32,348 25	$431 00	$244 00	$119,542 13	.....	.....	.....	$152,565 38	..
Danbury,	7,354,257	10,590 75	.....	14 00	33,898 70	$2,932 76	.. ...	$2,319 58	49,755 79	1
Bethel,	1,187,313	1,827 00	154 20	10 45	8,285 20	.....	.....	52 00	10,328 85	..
Brookfield,	437,717	447 75	.....	.....	1,936 50	.....	.....	.....	2,384 25	1
Darien,	2,347,860	888 75	153 85	.....	3,515 94	.....	$60 00	.....	4,618 54	1
Easton,	414,208	405 00	139 38	148 62	1,355 86	.....	.....	41 54	2,090 40	..
Fairfield,	3,104,888	1,935 00	360 00	233.68	7,530 69	.....	.....	79 93	10,139 30	..
Greenwich,	6,644,774	5,415 75	....	.....	17,160 05	11,399 12	92 00	263 49	34,330 41	7
Huntington,	3,980,406	2,497 50	175 00	107 92	10,752 57	.....	.....	35 00	13,567 99	..
Monroe,	373,491	407 25	78 00	.....	1,318 30	.....	.....	.....	1,803 55	..
New Canaan,	1,938,035	1,329 75	35 07	.....	8,630 01	.....	.....	.....	9,994 83	..
New Fairfield,	337,929	294 75	125 00	.....	1,160 35	.....	.....	.....	1,580 10	..
Newtown,	1,632,646	1,559 25	455 02	.....	4,564 73	376 16	20 80	20 00	6,995 96	..
Norwalk,	13,589,165	9,960 75	472 62	144 00	35,423 14	11,223 00	92 77	1,281 73	58,598 01	4
Redding,	511,563	546 75	173 22	10 15	1,528 40	.....	16 25	.....	2,274 77	..
Ridgefield,	1,604,429	1,179 00	230 40	.....	5,600 68	1,323 06	181 00	162 09	8,676 23	2
Sherman,	337,363	261 00	144 00	.....	1,048 45	.....	.....	.....	1,453 45	..
Stamford,	9,915,827	9,834 75	350 45	142 42	55,947 10	.....	.....	877 50	67,152 22	..
Stratford,	1,079,815	1,487 25	147 55	112 00	6,414 03	1,620 09	.....	25 00	9,805 92	1
Trumbull,	594,139	684 00	159 49	30 00	1,878 24	.....	36 00	35 00	2,822 73	..
Weston,	315,818	351 00	.....	141 63	848 51	.....	.....	.....	1,341 14	..
Westport,	2,307,923	1,800 00	224 36	.....	3,395 29	.....	10 00	.....	5,429 65	..
Wilton,	806,218	807 75	.....	.....	2,162 60	.....	11 20	.....	2,981 55	..
23 Towns.	$118,355,009	$86,859 00	$4,008 61	$1,338 87	$333,897 47	$28,874 19	$520 02	$5,192 86	$460,691 02	17

FAIRFIELD COUNTY

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Bridgeport,	$110,153 42	$14,773 66	$10,503 08	$335 73	.....	$16,799 49	$152,565 38	$3,000 00	.....	2.07	2.07	$10 61	$21 29
Danbury,	36,030 50	6,419 42	2,109 42	546 73	$1,944 80	9,398 67	56,449 54	688 40	$103,385 00	5.32	4.60	11 57	22 62
Bethel,	7,310 00	2,537 42	371 43	77 50	.....	.....	10,296 35	101 25	.....	7.02	6.97	12 68	18 19
Brookfield,	2,188 72	155 53	250 00	.....	.....	40 00	2,634 25	40 00	.....	4.42	4.42	13 23	22 04
Darien,	4,100 00	529 93	66 77	10 00	.....	100 00	4,806 70	100 00	3,349 00	1.52	1.49	12 16	22 30
Easton,	1,638 00	121 94	77 00	.....	.....	253 46	2,090 40	91 00	.....	3.37	3.27	11 61	19 09
Fairfield,	8,028 83	429 04	34 95	.....	.....	1,646 48	10,139 30	262 00	.....	2.45	2.42	11 78	21 92
Greenwich,	26,325 00	2,491 20	890 46	397 08	.....	4,554 29	34,658 03	407 58	72,500 00	4.35	2.58	14 39	26 15
Huntington,	10,495 00	1,230 25	562 94	96 00	.....	1,183 80	13,567 99	228 36	59,000 00	2.71	2.70	12 22	19 62
Monroe,	1,654 85	103 70	.....	.....	.....	45 00	1,803 55	45 00	.....	3.52	3.52	9 96	16 10
New Canaan	7,193 56	1,494 39	160 00	.....	.....	1,146 88	9,994 83	.....	.....	4.45	4.45	16 91	32 76
New Fairfield,	1,419 00	88 10	.....	.....	.....	106 00	1,613 10	73 00	.....	3.43	3.43	12 31	20 94
Newtown,	5,820 31	378 69	48 16	.....	.....	380 00	6,627 16	380 00	.....	3.05	2.79	9 56	22 46
Norwalk,	39,642 28	4,325 65	1,570 52	421 81	41,693 85	10,987 66	98,641 77	467 70	88,164 08	3.53	2.60	12 86	22 18
Redding,	2,052 05	145 97	3 75	.....	.....	73 00	2,274 77	73 00	.....	3.01	2.98	9 36	19 03
Ridgefield,	7,258 67	897 62	463 84	121 00	130 00	243 88	9,115 01	200 00	70 00	4.52	3.49	17 14	26 38
Sherman,	1,309 18	84 27	.....	.....	.....	60 00	1,453 45	60 00	.....	3.10	3.10	12 52	22 53
Stamford,	52,018 20	11,096 73	.....	.....	.....	4,037 29	67,152 22	2,575 00	.....	5.73	5.64	15 36	27 21
Stratford,	7,045 15	776 48	491 28	87 84	4,999 50	548 80	13,949 05	125 00	23,100 00	7.46	5.93	13 53	23 27
Trumbull,	2,432 00	159 17	91 31	71 00	.....	65 00	2,818 48	65 00	.....	3.28	3.16	9 27	19 64
Weston,	1,242 83	62 41	.....	.....	.....	30 00	1,335 24	30 00	.....	2.68	2.68	8 55	15 43
Westport,	4,800 00	501 06	.....	10 00	.....	128 45	5,439 51	125 00	900 00	1.47	1.47	6 79	14 20
Wilton,	2,743 49	128 81	1 20	10 00	.....	106 50	2,990 00	98 00	.....	2.69	2.68	8 32	16 61
23 Towns.	$342,901 04	$48,931 44	$17,696 11	$2,184 69	$48,768 15	$51,934 65	$512,416 08	$9,235 29	$350,468 08	3.11	2.82	$12 01	$22 51

* Of taxable property appropriated for Public Schools, in mills and tooths.
† Of taxable property appropriated for Public Schools by town tax, in mills and tooths.

WINDHAM COUNTY

TOWNS.	Grand List.	RECEIPTS.								Districts Taxing.
		School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	
Brooklyn,	$1,206,245	$1,113 75	$225 00	$10 08	$3,917 86	.....	.....	.....	$5,266 69	..
Ashford,	218,642	306 00	366 20	.....	624 42	.....	.....	.....	1,296 62	..
Canterbury,	417,871	346 50	144 78	19 20	1,505 38	.....	$10 00	.....	2,025 86	..
Chaplin,	172,736	222 75	124 36	.....	772 36	.....	.....	.....	1,119 47	..
Eastford,	151,975	299 25	189 66	.....	441 32	.....	.....	.....	930 23	..
Hampton,	275,182	315 00	232 64	.....	887 96	.....	.....	.....	1,435 60	..
Killingly,	2,151,058	3,321 00	461 82	.....	13,914 69	$2,706 40	.....	$429 05	20,832 96	1
Plainfield,	1,917,637	2,673 00	323 00	.....	6,374 98	84 92	38 00	40 93	9,534 83	..
Pomfret,	934,361	706 50	272 50	22 58	1,966 17	.....	.....	.....	2,967 75	..
Putnam,	3,072,499	3,422 25	259 04	13 98	8,397 80	.....	.....	.....	12,093 07	..
Scotland,	208,089	218 25	66 39	19 80	983 14	.....	.....	.....	1,287 58	..
Sterling,	360,970	625 50	.....	.....	1,427 15	833 96	.....	.....	2,886 61	2
Thompson,	1,555,292	3,102 75	101 82	.....	3,501 14	29 28	.....	2 50	6,737 49	..
Windham,	4,463,863	4,491 00	348 94	56 82	30,016 76	.....	.....	.....	34,913 52	..
Woodstock,	845,282	882 00	337 13	40 10	2,581 77	.....	.....	10 00	3,851 00	..
15 Towns.	$17,951,702	$22,045 50	$3,453 28	$182 56	$77,312 90	$3,654 56	$48 00	$482 48	$107,179 28	3

WINDHAM COUNTY

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Brooklyn,	$3,969 57	$651 93	$545 19	.....	.....	$100 00	$5,266 69	$100 00	.....	3.24	3.24	$10 63	$26 80
Ashford,	1,181 67	84 95	.....	.....	.....	30 00	1,296 62	29 00	.....	2.85	2.85	9 53	16 20
Canterbury,	1,819 31	122 35	.....	.....	.....	65 00	2,006 66	65 00	.....	3.62	3.60	13 03	17 75
Chaplin,	915 35	91 09	43 50	.....	.....	69 53	1,119 47	21 00	.....	4.47	4.47	11 30	18 97
Eastford,	853 55	37 68	.....	.....	.....	39 00	930 23	39 00	.....	2.90	2.90	6 99	13 28
Hampton,	1,285 90	90 70	.....	.....	.....	58 00	1,434 60	38 00	.....	3.22	3.22	10 24	13 92
Killingly,	14,755 35	2,544 56	658 09	$400 00	$1,205 00	1,104 01	20,667 01	397 60	$5,000 00	7 92	6.46	13 18	21 02
Plainfield,	8,196 69	808 62	101 92	90 93	.....	180 75	9,378 91	180 75	.....	3.40	3.32	7 89	14 22
Pomfret,	2,739 04	168 71	10 00	.....	.....	81 25	2,999 00	60 00	.....	2.10	2.10	9 55	16 52
Putnam,	8,813 41	1,375 14	.....	.....	.....	1,904 52	12,093 07	.....	.....	2.73	2.73	7 95	22 35
Scotland,	648 00	44 60	.....	.....	.....	594 98	1,287 58	10 80	1,100 00	4.72	4.72	13 27	17 28
Sterling,	1,858 06	142 09	.....	.....	725 00	52 50	2,777 65	52 50	325 00	6.26	3.95	7 38	12 47
Thompson,	5,880 27	589 79	29 28	.....	.....	240 00	6,739 34	240 00	.....	2.27	2.25	4 88	15 45
Windham,	22,033 03	1,661 19	1,846 10	.....	.....	9,373 20	34,913 52	190 09	60,868 79	6.72	6.72	17 49	34 31
Woodstock,	3,488 45	232 55	.....	10 00	.....	120 00	3,851 00	120 00	.....	3.06	3.05	9 82	17 82
15 Towns.	$78,437 65	$8,645 95	$3,234 08	$500 93	$1,930 00	$14,012 74	$106,761 35	$1,543 74	$67,293 79	4.53	4.30	$10 69	$21 67

* Of taxable property appropriated for Public Schools, in mills and 100ths.

† Of taxable property appropriated for Public Schools by town tax, in mills and 100ths.

LITCHFIELD COUNTY

TOWNS.	Grand List.	RECEIPTS.								Districts Taxing.
		School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	
Litchfield,	$2,862,564	$1,485 00	.....	.....	$8,148 38	.....	.....	.....	$9,633 38	..
Barkhamsted,	335,325	488 25	$264 24	.....	1,335 43	.....	.....	.....	2,087 92	1
Bethlehem,	348,471	256 50	79 40	.....	914 67	.....	$9 55	.....	1,260 12	..
Bridgewater,	357,962	292 50	148 87	$7 76	841 49	.....	.....	.....	1,290 62	..
Canaan,	452,152	382 50	.....	.....	1,473 92	.....	.....	.....	1,856 42	..
Colebrook,	295,669	396 00	.....	.....	1,524 32	.....	5 00	$1 00	1,926 32	..
Cornwall,	570,445	558 00	240 12	.....	1,386 67	.....	.....	.....	2,184 79	..
Goshen,	541,707	351 00	.....	.....	1,334 00	.....	49 96	.....	1,734 96	..
Harwinton,	343,217	697 50	240 74	.....	1,211 73	.....	.....	.....	2,149 97	..
Kent,	447,850	607 50	257 00	.....	2,286 67	$170 00	95 00	38 00	3,454 17	1
Morris,	331,318	252 00	133 02	.....	1,038 68	173 62	.....	68 13	1,665 45	..
New Hartford,	1,109,715	1,611 00	.....	.....	3,416 02	1,473 82	2 90	128 55	6,632 29	1
New Milford,	1,894,595	1,725 75	.....	137 36	7,678 48	.....	25 00	25 00	9,591 59	..
Norfolk,	996,342	744 75	193 62	67 70	2,749 31	.....	23 40	.....	3,778 78	..
North Canaan,	811,630	830 25	174 57	.....	2,280 18	.....	.....	.....	3,285 00	..
Plymouth,	963,006	1,158 75	159 03	.....	5,809 84	3,014 67	270 53	.....	10,412 82	1
Roxbury,	411,146	405 00	172 90	.....	1,125 57	.....	.....	.....	1,703 47	..
Salisbury,	1,730,236	1,683 00	171 70	77 70	5,846 37	170 80	.....	36 25	7,985 82	..
Sharon,	1,285,426	929 25	453 00	.....	3,884 87	44 37	.....	10 00	5,321 49	2
Thomaston,	1,513,864	1,462 50	.....	.....	6,755 17	.....	.....	.....	8,217 67	..
Torrington,	5,096,850	5,251 50	237 60	150 00	20,407 28	.....	.....	330 79	26,377 17	..
Warren,	221,485	195 75	.....	.....	809 25	.....	.....	.....	1,005 00	..
Washington,	993,075	859 50	249 80	.....	3,079 33	.....	25 00	25 00	4,238 63	..
Watertown,	1,370,974	1,257 75	253 15	.....	4,848 47	.....	2 75	93 00	6,455 12	..
Winchester,	4,556,185	3,552 75	273 05	.....	11,619 53	.....	.....	24 42	15,469 75	1
Woodbury,	945,438	873 00	275 07	19 38	2,543 93	.....	.....	.....	3,711 38	...
26 Towns.	$30,786,647	$28,307 25	$3,976 88	$459 90	$104,349 56	$5,047 28	$509 09	$780 14	$143,430 10	7

LITCHFIELD COUNTY

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Litchfield,	$7,142 00	$2,000 00	.....	$491 38	.....	.....	$9,633 38	$275 00	.....	2.84	2.84	$14 59	$21 72
Barkhamsted,	1,893 71	108 96	$350 00	.....	.....	$85 00	2,437 67	85 00	$185 00	3.98	3 98	11 23	19 73
Bethlehem,	1,119 51	101 06	9 55	.....	.....	30 00	1,260 12	30 00	49 85	2.65	2.62	11 05	21 17
Bridgewater,	1,173 45	67 17	.....	.....	.....	50 00	1,290 62	50 00	.....	2.35	2.35	9 92	17 44
Canaan,	1,679 00	143 17	....	.....	.....	34 25	1,856 42	34 25	.....	3.25	3.25	10 92	18 28
Colebrook,	1,739 05	133 27	49 40	.....	.....	54 00	1,975 72	54 00	.....	5.17	5.15	11 22	19 27
Cornwall,	1,998 68	57 31	28 80	.....	.....	100 00	2,184 79	100 00	.....	2.43	2.43	8 80	14 42
Goshen,	1,476 00	105 58	61 01	.....	.....	85 00	1,727 59	85 00	.....	2.55	2.46	11 07	18 28
Harwinton,	1,692 00	457 97	.....	.....	.....	.....	2,149 97	45 00	.....	3.53	3.53	6 93	15 46
Kent,	2,954 02	174 60	175 00	52 00	.....	85 75	3,441 37	85 75	.....	5.78	5.10	12 74	20 00
Morris,	1,319 54	80 16	161 83	.....	.....	105 92	1,667 45	38 00	.....	3.86	3.13	14 88	22 99
New Hartford,	4,593 46	492 11	344 63	.....	.....	191 50	5,621 70	125 00	553 43	4.52	3.07	7 85	32 30
New Milford,	7,322 79	1,128 27	627 05	50 00	.....	463 48	9,591 59	356 62	.....	4.07	4.05	12 50	19 04
Norfolk,	3,342 62	297 41	29 78	40 00	.....	95 35	3,805 16	71 00	.....	2.78	2.75	11 49	17 45
North Canaan,	2,692 04	500 67	622 36	.....	.....	60 00	3,875 07	60 00	.....	2.80	2.80	10 50	17 07
Plymouth,	6,378 31	566 18	2,257 96	.....	.....	299 18	9,501 63	112 50	2,205 00	9.44	6.03	18 44	26 91
Roxbury,	1,530 88	121 06	.....	.....	.....	51 50	1,703 44	51 50	.....	2.73	2.73	9 46	16 22
Salisbury,	6,646 10	781 42	181 75	.....	.....	376 55	7,985 82	297 68	.....	3.49	3.37	10 67	20 63
Sharon,	4,676 00	337 47	44 37	.....	.....	263 65	5,321 49	218 65	90 86	3.06	3.02	12 88	20 78
Thomaston,	6,519 66	432 86	60 78	35 00	.....	1,169 37	8,217 67	198 00	.....	4.46	4.46	12 64	16 80
Torrington,	18,826 48	5,016 71	953 18	850 75	.....	730 05	26,377 17	2,500 00	.....	4.06	4.00	11 30	22 67
Warren,	922 00	53 00	.....	.....	.....	30 00	1,005 00	30 00	.....	3.65	3.65	11 55	18 78
Washington,	3,271 36	285 37	369 81	20 00	.....	292 09	4,238 63	98 50	.....	3.15	3.10	11 09	19 66
Watertown,	5,472 81	738 31	120 58	87 19	.....	165 40	6,584 29	154 40	200 00	3.60	3.53	11 77	17 30
Winchester,	12,796 55	904 77	449 73	215 24	.....	2,402 68	16,768 97	240 00	9,800 00	2.55	2.55	10 61	23 71
Woodbury,	3,376 28	220 10	.....	.....	.....	115 00	3,711 38	115 00	.....	2.69	2.69	9 56	15 86
26 Towns.	$112,554 30	$15,304 96	$6,897 57	$1,841 56	.....	$7,335 72	$143,934 11	$5,510 85	$13,084 14	3.59	3.38	$11 44	$20 55

*Of taxable property appropriated for Public Schools, in mills and rooths.

†Of taxable property appropriated for Public Schools by town tax, in mills and rooths.

MIDDLESEX COUNTY

TOWNS.	Grand List.	RECEIPTS.								Districts Taxing.
		School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	
Middletown,	.....	$2,934 00	$335 45	$116 00	$6,692 83	$21 68	$38 95	$62 83	$10,201 74	..
" City,	.....	4,189 50	479 00	69 55	5,500 00	19,831 96	.....	3,628 80	33,698 81	1
" complete,	$8,616,520	7,123 50	814 45	185 55	12,192 83	19,853 64	38 95	3,691 63	43,900 55	1
Haddam,	619,615	1,066 50	98 18	.....	2,591 57	1,085 94	66 20	89 50	4,997 89	..
Chatham,	684,296	985 50	234 28	.....	3,176 67	.....	.....	197 02	4,593 47	..
Chester,	488,766	609 75	133 44	.....	2,202 64	.....	.....	.....	2,945 83	..
Clinton,	692,833	582 75	53 43	34 98	.....	.....	.....	.....	671 16	..
Cromwell,	965,395	1,129 50	148 69	14 63	3,046 69	.....	.....	30 00	4,369 51	..
Durham,	443,983	342 00	158 40	61 08	1,103 10	.....	.....	12 45	1,677 03	..
East Haddam,	1,066,673	1,028 25	278 08	23 44	3,381 11	.....	20 58	61 63	4,793 09	..
Essex,	826,057	819 00	235 94	50 00	3,216 29	.....	.....	.....	4,321 23	..
Killingworth,	187,473	303 75	163 85	10 00	1,495 33	.....	.....	.....	1,972 93	..
Middlefield,	435,310	396 00	90 49	36 00	1,112 51	10 00	.....	.....	1,645 00	..
Old Saybrook,	600,540	648 00	140 33	.....	3,453 88	.....	.....	.....	4,242 21	..
Portland,	1,882,102	2,360 25	196 66	639 25	9,428 39	8,045 23	128 29	82 35	20,880 42	..
Saybrook,	684,390	693 00	84 68	7 00	3,101 53	.....	38 20	418 00	4,342 41	..
Westbrook,	485,535	344 25	162 56	.....	1,004 22	.....	.....	.....	1,511 03	..
15 Towns.	$18,679,488	$18,432 00	$2,993 46	$1,061 93	$50,506 76	$28,994 81	$292 22	$4,582 58	$106,863 76	1

MIDDLESEX COUNTY

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Middletown,	$8,485 15	$624 46	$315 48	$58 50	.....	$642 62	$10,126 21	$381 43	$700 00	.....	.....	$7 76	$11 54
" City,	17,057 74	3,624 58	1,211 42	89 75	.....	8,683 79	30,667 28	2,600 00	89,475 00	.....	.....	16 47	29 29
" complete,	25,542 89	4,249 04	1,526 90	148 25	.....	9,326 41	40,793 49	2,981 43	90,175 00	4.15	1.41	12 88	21 20
Haddam,	3,584 47	232 75	473 49	67 50	.....	165 20	4,523 41	100 00	.....	6.18	4.18	9 54	17 36
Chatham,	3,801 94	396 25	4 23	25 00	.....	330 80	4,558 22	100 00	.....	4.93	4.64	10 40	15 99
Chester,	2,268 00	235 63	48 35	.....	.....	393 85	2,945 83	44 00	.....	4.50	4.50	10 87	16 36
Clinton,	584 00	87 16	.....	.....	.....	.....	671 16	.....	.....	.....	.....	2 59	38 35
Cromwell,	3,424 50	245 33	184 35	60 69	.....	453 64	4,368 51	66 00	.....	3.18	3.15	8 70	14 80
Durham,	1,627 00	118 35	4 00	8 66	.....	84 61	1,842 62	40 00	1,133 58	2.51	2.48	12 12	20 13
East Haddam,	4,240 73	341 78	57 75	33 10	.....	209 00	4,882 36	199 25	.....	3.24	3.16	10 68	16 55
Essex,	3,426 76	247 15	55 52	.....	.....	591 80	4,321 23	11 25	.....	3.89	3.89	11 87	17 85
Killingworth,	1,671 00	77 12	36 06	124 00	.....	64 75	1,972 93	48 00	.....	7.97	7.97	14 61	25 13
Middlefield,	1,467 00	143 00	10 00	.....	.....	25 00	1,645 00	25 00	300 00	2.57	2.55	9 34	15 02
Old Saybrook,	2,873 63	347 94	67 60	50 00	.....	903 04	4,242 21	3 00	10,000 00	5.75	5.75	14 72	26 68
Portland,	10.235 00	1,630 87	590 08	316 45	.....	582 82	13,355 22	199 00	.....	9.39	5.00	12 73	22 79
Saybrook,	3,030 00	374 28	34 95	58 20	.....	844 98	4,342 41	60 00	10,000 00	5.19	4.53	14 09	18 59
Westbrook,	1,371 00	75 40	29 63	9 00	.....	26 00	1,511 03	26 00	.....	2.06	2.06	9 87	16 07
15 Towns.	$69,147 92	$8,802 05	$3,122 91	$900 85	.....	$14,001 90	$95,975 63	$3,902 93	$111,608 58	4.51	2.70	$11 71	$19 78

* Of taxable property appropriated for Public Schools, in mills and 100ths.
† Of taxable property appropriated for Public Schools by town tax, in mills and 100ths.

TOLLAND COUNTY

TOWNS.	Grand List.	RECEIPTS.								Districts Taxing.
		School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	
Tolland,	$372,557	$501 75	$237 92	.....	$2,210 18	.....	.....	.....	$2,949 85	..
Andover,	221,422	123 75	111 80	$8 62	248 05	.....	.....	.....	492 22	..
Bolton,	163,255	189 00	114 58	24 66	647 67	.....	.....	.....	975 91	..
Columbia,	236,101	355 50	.....	19 67	1,029 99	.....	.....	.....	1,405 16	..
Coventry,	624,985	738 00	188 77	26 11	2,742 63	$39 82	.. ...	$274 40	4,009 73	..
Ellington,	713,448	810 00	224 21	.....	3,245 39	591 67	.....	5 05	4,876 32	..
Hebron,	424,263	391 50	242 40	89 35	1,535 03	.....	$5 00	62 64	2,325 92	..
Mansfield,	519,517	789 75	303 04	32 80	2,329 38	96 00	5 00	95 32	3,651 29	1
Somers,	627,168	643 50	179 41	.....	3,098 98	.....	.....	.....	3,921 89	..
Stafford,	1,280,429	2,007 00	6 00	.....	8,704 46	3,227 23	32 00	22 00	13,998 69	2
Union,	126,291	216 00	109 50	.....	798 02	.....	.....	.....	1,123 52	..
Vernon,	3,087,880	4,164 75	49 44	.....	18,827 40	2,069 30	16 00	1,477 89	26,604 78	2
Willington,	202,066	445 50	.....	.....	1,446 04	.....	10 00	10 00	1,911 54	..
13 Towns.	$8,599,382	$11,376 00	$1,767 07	$201 21	$46,863 22	$6,024 02	$68 00	$1,947 30	$68,246 82	5

TOLLAND COUNTY

TOWNS.	EXPENSES.							Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
	Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.						
Tolland,	$2,698 77	$185 08	.....	.....	.....	$66 00	$2,949 85	$66 00	.....	5.93	5.93	$13 22	$21 53
Andover,	360 00	122 22	.....	.....	.....	10 00	492 22	12 00	.....	1.12	1.12	8 94	19 30
Bolton,	885 00	61 41	$3 00	.....	.....	27 00	976 41	24 00	.....	3.96	3.96	11 62	20 55
Columbia,	1,189 79	68 21	.....	.....	.....	147 16	1,405 16	35 00	.....	4.36	4.36	8 89	19 11
Coventry,	3,228 26	226 23	67 78	$65 00	.....	313 91	3,901 18	133 00	.....	4.89	4.38	11 89	18 35
Ellington,	3,597 82	357 40	84 08	.....	.....	485 25	4,524 55	80 40	$5,120 00	5.38	4.54	12 56	21 54
Hebron,	2,034 85	127 22	8 95	10 00	.....	70 05	2,251 07	56 00	121 00	3.77	3.61	12 93	19 07
Mansfield,	3,217 43	197 89	166 33	23 75	.....	80 00	3,685 40	80 00	.....	4.86	4.48	10 49	18 06
Somers,	3,504 00	351 89	.....	.....	.....	66 00	3,921 89	66 00	.....	4.94	4.94	13 71	18 94
Stafford,	9,244 00	1,355 03	119 13	.....	.....	3,035 16	13,753 32	236 10	13,400 00	9.36	6.79	14 00	24 42
Union,	977 57	58 64	.....	.....	.....	87 01	1,123 22	45 00	.....	6.31	6.31	11 70	18 56
Vernon,	17,731 91	3,179 35	939 36	524 80	.....	1,701 20	24,076 62	291 95	13,842 93	7.25	6 09	13 00	20 92
Willington,	1,657 61	116 96	.....	20 00	.....	116 97	1,911 54	63 50	9 00	7.25	7.15	9 65	16 19
13 Towns.	$50,327 01	$6,407 53	$1,388 63	$643 55	.....	$6,205 71	$64,972 43	$1,188 95	$32,492 93	6.38	5.44	$12 62	$20 77

* Of taxable property appropriated for Public Schools, in mills and tooths.

† Of taxable property appropriated for Public Schools by town tax, in mills and tooths.

SUMMARY BY COUNTIES

COUNTIES.	Grand List.	RECEIPTS. School Fund, etc.	Town Deposit.	Local Funds.	Town Tax.	District Tax.	Voluntary Contrib.	Other Sources.	Total.	Districts Taxing.
Hartford,	$103,107,307	$82,100 25	$6,480 01	$2,865 06	$371,832 02	$174,647 50	$2,974 66	$29,368 24	$670,267 74	29
New Haven,	122,034,035	126,911 25	3,142 91	667 63	291,375 75	462,132 17	148 50	186,324 19	1,070,702 40	20
New London,	38,327,595	38,245 50	4,862 99	528 90	108,476 44	60,312 41	344 45	8,820 51	221,591 20	21
Fairfield,	118,355,009	86,859 00	4,008 61	1,338 87	333,897 47	28,874 19	520 02	5,192 86	460,691 02	17
Windham,	17,951,702	22,045 50	3,453 28	182 56	77,312 90	3,654 56	48 00	482 48	107,179 28	3
Litchfield,	30,786,647	28,307 25	3,976 88	459 90	104,349 56	5,047 28	509 09	780 14	143,430 10	7
Middlesex,	18,679,488	18,432 00	2,993 46	1,061 93	50,506 76	28,994 81	292 22	4,582 58	106,863 76	1
Tolland,	8,599,382	11,376 00	1,767 07	201 21	46,863 22	6,024 02	68 00	1,947 30	68,246 82	5
The State,	$457,841,165	$414,276 75	$30,685 21	$7,306 06	$1,384,614 12	$769,686 94	$4,904 94	$237,498 30	$2,848,972 32	103

SUMMARY BY COUNTIES

COUNTIES.	EXPENSES. Teachers' Wages.	Fuel, etc.	Repairs.	Libraries and Apparatus.	New Buildings.	Other Objects.	Total.	Cost of Superintendence.	District Indebtedness.	Per cent., etc.*	Per cent., etc.†	Paid for each child enumerated.	Paid for each child in average attendance.
Hartford,	$425,632 55	$45,553 11	$28,522 39	$10,741 53	$36,042 36	$126,568 09	$673,060 03	$8,940 17	$905.291 59	5.61	3 60	$17 40	$28 06
New Haven,	615,000 64	105,786 13	40,318 77	5,264 35	224,136 85	143,551 54	1,134,058 28	15,785 26	1,494,386 76	7.70	2.38	16 13	28 18
New London,	156,209 61	18,227 35	8,384 05	2,906 65	46,956 91	22,300 11	254,984 68	5,615 16	189,912 50	4.64	2.83	12 22	21 65
Fairfield,	342,901 04	48,931 44	17,696 11	2,184 69	48,768 15	51,934 65	512,416 08	9,235 29	350,468 08	3.11	2.82	12 01	22 51
Windham,	78,437 65	8,645 95	3,234 08	500 93	1,930 00	14,012 74	106.761 35	1,543 74	67,293 79	4.53	4.30	10 69	21 67
Litchfield,	112,554 30	15,304 96	6,897 57	1,841 56	.....	7,335 72	143,934 11	5,510 85	13,084 14	3 59	3.38	11 44	20 55
Middlesex,	69,147 92	8,802 05	3,122 91	900 85	.....	14,001 90	95,975 63	3,902 93	111,608 58	4.51	2.70	11 71	19 78
Tolland,	50.327 01	6,407 53	1,388 63	643 55	.....	6,205 71	64,972 43	1,188 95	32,492 93	6.38	5.44	12 62	20 77
The State,	$1,850,210 72	$257,658 52	$109,564 51	$24,984 11	$357,834 27	$385,910 46	$2,986,162 59	$51,722 35	$3,164,538 37	5.23	3.02	$14 25	25 03

* Of taxable property appropriated for Public Schools, in mills and tooths.

† Of taxable property appropriated for Public Schools by town tax, in mills and tooths.

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Hartford,	53,230	13,809	10,990	9,596	9,263	305	3,942	2,085	7,821	7,821	79.5	56.6	82.9
Avon,	1,182	246	228	213	215	...	7	5	157	145	92.6	61.3	70.5
Berlin,	2,600	555	512	460	441	3	60	70	332	304	92.2	57.2	70.5
Bloomfield,	1,308	254	237	204	188	...	21	30	158	154	93.3	61.4	79.5
Bristol,	7,382	1,919	2,029	1,730	1,691	80	4	198	1,462	1,412	105.7	74.8	84.0
Burlington,	1,302	275	251	226	212	...	....	6	180	166	91.2	62.9	78.9
Canton,	2,500	658	691	612	582	25	....	97	523	495	105.0	77.3	85.2
East Granby,	661	114	110	97	87	3	8	9	79	66	96.4	63.6	78.8
East Hartford,	4,455	1,476	1,522	1,293	1,219	...	110	159	1,029	987	103.1	68.2	80.2
East Windsor,	2,890	732	620	541	535	1	7	43	445	437	84.6	60.2	81.9
Enfield,	7,199	1,558	1,127	1,002	931	40	138	210	858	842	72.3	54.5	87.9
Farmington,	3,179	692	691	609	623	13	18	32	494	517	99.8	73.0	82.0
Glastonbury,	3,457	790	704	606	594	2	47	75	501	481	89.1	62.1	81.8
Granby,	1,251	240	242	203	184	13	2	32	170	155	100.8	67.7	83.9
Hartland,	565	92	108	86	80	12	....	3	67	61	117.3	69.5	77.1
Manchester,	.....	1,040	954	836	792	...	....	123	705	656	91.7	65.4	83.5
" Ninth District,	.....	1,168	1,280	1,151	1,130	26	4	101	952	927	109.5	80.4	82.3
" Complete,	8,222	2,208	2,234	1,987	1,922	26	4	224	1,657	1,583	101.1	73.3	82.8
Marlborough,	582	77	70	65	58	1	....	7	53	40	90.9	60.3	75.6
New Britain,	19,007	5,179	3 898	3,921	3,896	221	1,482	724	3,249	3,236	75.2	62.6	82.9
Newington,	953	172	144	119	123	3	6	9	121	92	83.7	61.9	88.0
Plainville,	1,993	378	379	340	339	32	....	34	284	285	100.2	75 2	83.7
Rocky Hill,	1,069	226	208	183	190	3	4	16	144	137	92 0	62.1	75 3
Simsbury,	1,874	400	365	334	304	1	21	15	279	259	91.2	67.2	84.3
Southington,	5,501	1,189	1,177	1,027	1,018	77	....	82	903	847	98.9	73.5	85.5
South Windsor,	1,736	350	348	298	289	10	....	37	245	235	99.4	68 5	81.7
Suffield,	3,169	618	547	457	425	8	30	36	367	360	88.5	58 8	82.4
West Hartford,	1,930	534	607	491	514	14	49	27	421	417	113.6	78.4	83.3
Wethersfield,	2,271	412	419	369	367	12	....	....	297	294	101.6	71.7	80.2
Windsor,	2,954	696	694	610	585	8	11	77	486	433	99.7	66.0	76.9
Windsor Locks,	2,758	749	221	209	202	5	405	123	173	177	29.5	23.3	85.1
29 Towns.	147,180	36,598	31,373	27,888	27,077	918	6,376	4,465	22,955	22,438	85.7	62.0	82.5

NEW HAVEN COUNTY

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
New Haven City,	.....	21,648	16,559	13,826	13,826	820	2,898	3,642	12,981	12,981	76.4	59.9	93.8
" Westville,	.....	489	445	383	379	....	....	44	338	321	91.0	67.3	86.4
" South,	.....	69	64	51	62	....	6	7	37	46	92.7	60.1	73.4
" complete,	86,045	22,206	17,068	14,260	14,267	820	2,904	3,693	13,356	13,348	76.8	60.1	93.6
Ansonia,	10,342	2,801	2,346	2,167	2,223	27	128	307	1,837	1,984	83.7	68.2	87.0
Beacon Falls,	505	81	74	61	55	....	1	16	49	40	91.3	54.9	76.7
Bethany,	550	116	120	106	105	1	4	5	79	66	103.4	62.5	68.7
Branford,	4,460	1,081	1,095	945	892	20	.. .	25	752	719	101.2	68.0	80.0
Cheshire,	1,929	311	353	307	291	19	....	29	235	202	113.5	70.2	73.0
Derby,	5,969	1,645	860	742	752	38	535	420	621	624	52.2	37.8	83.3
East Haven,	955	235	204	171	171	2	18	8	132	110	86.8	51.4	70.7
Guilford,	2,780	563	535	492	449	10	....	29	352	333	95.0	60.8	72.7
Hamden,	3,882	919	784	698	618	3	83	176	559	489	85.3	57.0	79 6
Madison,	1,429	302	320	283	262	.. .	....	30	219	210	105.9	71.0	78.7
Meriden,	25,423	6,283	4,128	3,840	3,658	186	1,722	976	3,293	3,039	65 7	50.3	84.4
Middlebury,	566	147	137	119	112	....	1	4	89	79	93.1	57.1	72.7
Milford,	3,811	755	687	562	539	28	20	145	454	429	90.9	58.4	80.1
Naugatuck,	6,218	2,150	1,899	1,751	1,816	27	56	206	1,470	1,535	88.3	69.8	84.2
North Branford,	825	185	157	144	128	2	....	3	112	90	84.8	54.5	74.2
North Haven,	1,862	359	350	298	293	1	....	40	234	220	97.4	63.2	76.8
Orange,	4,537	1,428	1,421	1,246	1,129	7	12	168	964	887	99.5	64.8	77.9
Oxford,	902	215	221	193	166	1	1	21	113	96	102.7	48.6	58.2
Prospect,	445	102	96	87	69	....	3	8	70	53	94.1	60.2	78.8
Seymour,	3,300	752	626	573	548	13	....	126	515	474	83.2	65.7	88.2
Southbury,	1,089	234	206	181	169	....	13	24	130	114	88.0	52.1	69.7
Wallingford,	6,584	1,947	1,857	1,474	1,486	78	18	161	1,404	1,397	95.3	71.9	94.6
Waterbury,	.....	1,234	1,045	918	836	4	8	132	693	673	84.6	55.3	77.8
" Centre,	.....	10,017	6,817	5,465	5,108	329	1,603	2,649	4,785	4,472	68.0	46.2	87.5
" complete,	33,202	11,251	7,862	6,383	5,944	333	1,611	2,781	5,478	5,145	69.8	47.2	86.1
Wolcott,	522	138	115	104	98	2	....	13	83	74	83.3	56.8	77.7
Woodbridge,	926	199	182	164	133	....	10	31	117	102	91.4	55.6	73.7
26 Towns.	209,058	56,405	43,703	37,351	36,373	1,618	7,140	9,445	32,717	31,859	77.4	57.2	87.5

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
New London,	13,757	3,079	2,566	2.302	2,210	62	430	82	1,813	1,752	83.3	57.8	79.0
Norwich Town,	.....	242	250	212	217	6	16	36	189	167	103.3	73.5	82.9
" Central,	.....	1,433	1,182	1,070	1,044	20	150	121	925	879	82.4	62.9	85.3
" West Chelsea,	.....	1,102	957	869	828	...	84	61	730	638	86.8	62.0	80.6
" Falls District,	.....	274	178	155	128	...	61	35	115	94	64.9	38.1	73.8
" other Districts,	.....	2,195	1,100	940	845	...	858	322	728	716	50.1	32.8	80.8
" complete,	23,048	5,246	3,667	3,246	3,062	26	1,169	575	2,687	2,494	69.9	49.3	82.1
Bozrah,	1,005	159	162	135	117	3	1	4	102	89	101.8	60.0	75.7
Colchester,	2,988	466	399	359	342	1	12	5	292	276	85.6	60.9	81.0
East Lyme,	2,048	335	360	316	294	6	....	35	251	215	107.4	69.5	76.3
Franklin,	585	104	112	88	77	1	1	4	66	58	107.6	59.6	75.1
Griswold,	3,113	883	881	733	714	8	....	106	567	587	99.7	65.3	79.7
Groton,	5,539	1,090	1,085	910	897	28	30	129	732	693	99.5	65.3	78.8
Lebanon,	1,670	310	330	279	256	9	....	15	207	200	106.4	65.6	76.0
Ledyard,	1,183	273	302	265	236	11	....	9	209	183	110.6	71.7	78.2
Lisbon,	548	118	100	99	86	2	....	12	69	57	84.7	53.3	68.1
Lyme,	977	145	143	119	102	2	...	....	89	79	98.6	57.9	76.0
Montville,	2,344	565	554	491	490	5	3	31	371	387	98.0	67.0	77.2
North Stonington,	1,463	297	303	255	215	11	13	28	204	180	102.0	64.6	81.7
Old Lyme,	1,319	209	211	198	181	4	3	13	162	139	100.9	72.0	79.4
Preston,	2,555	669	611	503	427	11	24	59	394	306	91.3	52.3	75.2
Salem,	481	119	111	102	94	3	1	20	82	70	93.2	63.8	77.5
Sprague,	1,106	372	307	240	220	1	115	39	172	168	82.5	45.6	73.9
Stonington,	7,184	1,697	1,367	1,258	1,196	44	291	138	971	959	80 5	56.8	78.6
Voluntown,	1,060	201	214	173	161	1	6	11	129	109	106 4	59.2	71.2
Waterford,	2,661	675	600	480	439	1	42	56	336	308	88.8	47.7	70.0
21 Towns.	76,634	17,012	14,385	12,551	11,816	240	2,141	1,371	9,905	9,309	84.5	56.4	78.8

FAIRFIELD COUNTY

TOWNS.	Population. 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Bridgeport,	48,866	14,377	9,147	8,421	8,245	374	2,164	3,066	7,277	7,062	63.6	49.8	86.0
Danbury,	19,473	4,707	3,199	2,853	2,804	99	1,284	625	2,428	2,390	67.9	51.1	84.7
Bethel,	3,401	812	732	671	679	5	....	80	553	579	90.1	69.7	83.8
Brookfield,	989	199	211	194	175	...	11	16	123	116	106.0	60.0	64.7
Darien,	2,276	395	339	305	299	8	15	41	241	190	85.8	54.5	71.3
Easton,	1,001	180	188	161	150	3	8	32	111	108	104.4	60.8	70.4
Fairfield,	3,868	860	799	690	638	2	50	110	493	432	92.9	53.7	69.6
Greenwich,	10,131	2,407	2,041	1,828	1,746	46	307	313	1,400	1,250	84.7	55.0	74.1
Huntington,	4,006	1,110	947	871	825	21	66	117	704	679	85.3	62.2	81.5
Monroe,	994	181	182	170	166	4	3	19	123	101	100.5	61.8	66.6
New Canaan,	2,701	591	588	517	475	10	44	85	334	276	99.4	51.6	61.4
New Fairfield,	670	131	143	116	113	4	....	14	82	72	109.1	58.7	67.2
Newtown,	3,539	693	461	420	396	13	177	58	317	273	66.5	42.5	72.3
Norwalk,	17,747	4,427	3,491	3,106	2,976	95	633	396	2,580	2,555	78.8	57.9	84.4
Redding,	1,546	243	201	173	185	1	36	15	120	119	82.7	49.1	66.7
Ridgefield,	2,235	524	498	460	465	11	16	32	351	330	95.0	64.9	73.6
Sherman,	668	116	111	92	93	...	....	9	67	62	95.6	55.6	69.7
Stamford,	15,700	4,371	3,687	3,184	2,965	232	684	820	2,523	2,412	84.3	56.4	80.2
Stratford,	2,608	661	601	529	513	9	30	58	410	359	90.9	58.1	73.8
Trumbull,	1,453	304	249	220	223	1	5	52	146	141	81.9	47.2	64.7
Weston,	772	156	153	145	130	3	....	1	96	77	98.0	55.4	62.9
Westport,	3,715	800	645	595	531	6	18	117	432	334	80.6	47.8	68.0
Wilton,	1,722	359	319	300	303	5	3	9	180	180	88.8	50.1	59.7
23 Towns.	150,081	38,604	28,932	26,051	25,095	952	5,554	6,085	21,091	20,097	74.9	53.3	80.5

WINDHAM COUNTY

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Brooklyn,	2,628	495	316	270	218	9	112	142	207	186	63.8	39.6	80.5
Ashford,	778	136	163	128	104	..	...	...	90	70	119.8	58.8	68.9
Canterbury,	947	154	169	158	117	3	...	11	126	100	109.7	73.3	82.1
Chaplin,	542	99	84	67	70	7	3	21	58	60	84.8	59.5	86.1
Eastford,	561	133	118	97	82	1	1	1	81	59	88.7	52.6	78.2
Hampton,	632	140	160	137	108	2	...	1	113	93	114.2	73.5	84.0
Killingly,	7,027	1,476	1,354	1,182	1,117	19	130	125	941	910	91.7	62.7	80.5
Plainfield,	4,582	1,188	1,059	881	797	10	26	99	695	624	89.1	55.5	78.6
Pomfret,	1,471	314	295	234	215	5	13	49	190	173	93.9	57.8	80.8
Putnam,	6,512	1,521	805	665	621	44	575	185	529	553	52.9	35.5	84.1
Scotland,	506	97	99	91	80	4	...	2	80	69	102.0	76.8	87.1
Sterling,	1,051	278	272	225	221	1	1	35	168	161	97.8	59.1	73.7
Thompson,	5,580	1,379	650	537	538	..	640	217	435	437	47.1	31.6	81.1
Windham,	10,032	1,996	1,565	1,254	1,223	98	792	188	1,008	1,027	78.4	50.9	82.1
Woodstock,	2,309	392	383	286	270	2	8	1	223	209	97.7	55.1	77.6
15 Towns.	45,158	9,798	7,492	6,212	5,781	205	2,301	1,077	4,944	4,731	76.4	49.3	80.6

LITCHFIELD COUNTY

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Litchfield,	3,304	660	583	537	521	45	10	73	448	439	88.3	67.1	83.8
Barkhamsted,	1,130	217	223	181	156	4	3	14	132	115	102.7	56.9	73.2
Bethlehem,	543	114	99	88	74	6	...	15	72	47	86.8	52.1	73.4
Bridgewater,	617	130	133	111	97	6	...	16	74	74	102.3	56.9	71.1
Canaan,	970	170	170	150	122	...	12	1	110	93	100.0	59.7	74.6
Colebrook,	1,098	176	193	161	114	8	...	1	117	88	109.6	58.2	74.5
Cornwall,	1,283	248	246	193	183	...	8	40	152	151	95.1	61.0	80.5
Goshen,	972	156	151	133	115	...	...	5	97	92	96.7	60.5	76.2
Harwinton,	943	310	241	204	172	5	...	62	143	135	77.7	44.8	73.9
Kent,	1,383	270	262	241	220	5	13	12	181	163	97.0	63.7	74.6
Morris,	584	112	133	117	73	5	...	1	83	62	118.7	64.7	76.3
New Hartford,	3,160	716	404	281	266	3	253	88	179	169	56.4	24.3	63.6
New Milford,	3,917	767	777	658	664	26	32	70	487	521	101.3	65.7	76.2
Norfolk,	1,546	331	328	276	272	4	18	35	219	217	99.0	65.8	79.5
North Canaan,	1,683	369	385	341	294	33	2	47	263	191	104.3	61.5	71.4
Plymouth,	2,147	515	519	463	461	5	5	38	363	343	100.7	68.5	76.4
Roxbury,	936	180	191	152	145	...	28	21	105	105	106.1	58 3	70.7
Salisbury,	3,420	748	652	517	498	17	122	31	395	379	87.1	51.7	76.2
Sharon,	2,149	413	427	381	381	24	10	17	266	246	103.3	61.9	67.1
Thomaston,	3,278	650	601	568	551	20	5	64	498	480	92.4	75.2	87.3
Torrington,	6,048	2,334	1,592	1,304	1,350	80	779	330	1,099	1,228	68.2	71.2	87.6
Warren,	477	87	91	73	67	...	...	4	57	50	104 5	61.4	76.4
Washington,	1,633	382	324	288	264	5	38	36	224	207	84.8	56.4	78.0
Watertown,	2,323	559	563	485	485	13	6	40	379	382	100.7	68.0	78.4
Winchester,	6,183	1,579	977	859	839	2	472	155	689	725	61.8	44.7	83.2
Woodbury,	1,815	388	370	319	280	5	28	45	240	228	95.3	60.3	78.1
26 Towns.	53,542	12,581	10,635	9,081	8,664	321	1,844	1,261	7,072	6,930	84.5	55.6	78.9

MIDDLESEX COUNTY

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Middletown,	.....	1,304	1,267	1,120	1,082	119	50	27	902	852	97.1	67.2	79.6
" City,	.....	1,862	1,268	1,148	1,098	117	558	282	1,063	1,031	68.0	56.2	93.2
" complete,	15,205	3,166	2,535	2,268	2,180	236	608	309	1,965	1,883	80.0	60.7	86.5
Haddam,	2,095	474	391	348	341	8	4	24	273	248	82.4	54.9	75.6
Chatham,	1,949	438	450	373	358	....	1	52	302	268	102.7	65.0	77.9
Chester,	1,301	271	255	221	203	4	....	18	184	176	94.0	66.4	84.9
Clinton,	1,384	259	33	28	21	....	197	29	20	15	12.7	6.7	71.4
Cromwell,	1,987	502	431	390	368	1	13	82	306	284	85.8	58.7	77.8
Durham,	856	152	152	144	133	....	3	12	104	79	100.0	60.1	66.0
East Haddam,	2,599	457	475	406	354	7	....	12	321	269	103.9	64.5	77.6
Essex,	2,035	364	320	327	271	....	....	49	251	233	87.9	66.4	80.9
Killingworth,	582	135	137	117	105	....	1	7	87	70	101.4	58.1	70.7
Middlefield,	1,002	176	148	139	135	3	4	12	119	100	84.0	62.2	79.9
Old Saybrook,	1,484	288	230	209	213	....	17	41	163	155	79.8	55.2	75.3
Portland,	4,687	1,049	771	693	684	20	164	141	603	569	73.4	55.8	85.1
Saybrook,	1,484	308	282	269	243	15	2	34	246	221	91.5	75.8	91.2
Westbrook,	874	153	150	137	119	1	....	20	100	88	98.0	61.4	73.4
15 Towns.	39,524	8,192	6,760	6,069	5,728	295	1.014	842	5,044	4,658	82.5	59.2	82.2

TOLLAND COUNTY

TOWNS.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars.	Winter.	Summer.	Over 16.			Winter.	Summer.			
Tolland,	1,037	223	200	193	174	10	8	25	144	130	89.6	61.4	74.6
Andover,	401	55	48	36	32	2	4	9	27	24	87.2	46.3	75.0
Bolton,	452	84	84	71	60	....	1	12	54	41	100.0	56.5	72.5
Columbia,	740	158	133	121	117	....	....	16	75	72	84.1	46.5	61.7
Coventry,	1,875	328	333	285	259	6	4	8	220	205	101.5	64.7	77.5
Ellington,	1,539	360	295	252	247	....	2	53	212	208	81.9	58.3	84.1
Hebron,	1,039	174	177	150	144	5	1	21	122	114	101.7	67.8	80.2
Mansfield,	1,911	351	351	298	252	8	8	7	222	186	100.0	58.1	74.1
Somers,	1,407	286	312	260	258	7	14	20	216	198	109.0	72.3	79.9
Stafford,	4,535	982	785	649	668	32	197	89	574	552	79.9	57.3	85 4
Union,	431	96	110	81	88	....	....	....	55	66	114.5	63.0	71.5
Vernon,	8,808	1,851	1,546	1,326	1,299	83	440	339	1,169	1,132	83.5	62.1	87.6
Willington,	906	198	179	159	137	....	....	38	127	109	90 4	59.5	79.7
13 Towns.	25,081	5,146	4,553	3,881	3,735	153	679	637	3,217	3,037	88.4	60.7	82.1

SUMMARY BY COUNTIES

COUNTIES.	Population, 1890.	Enumerated October, 1897.	Registered.				In Private Schools.	In no School.	Average Attendance.		Per cent. who attended some part of the year.	Per ct. of attendance on basis of enumeration.	Per ct. of attendance on basis of registration.
			Different Scholars	Winter.	Summer.	Over 16.			Winter.	Summer.			
Hartford,	147,180	36,598	31,373	27,888	27,077	918	6,376	4,465	22,955	22,438	85.7	62.0	82.5
New Haven,	209,058	56,405	43,703	37,351	36,373	1,618	7,140	9,445	32,717	31,859	77.4	57.2	87.5
New London,	76,634	17,012	14,385	12,551	11,816	240	2,141	1,371	9,905	9,309	84.5	56.4	78.8
Fairfield,	150,081	38,604	28,932	26,051	25,095	952	5,554	6,085	21,091	20,097	74.9	53.3	80.5
Windham,	45,158	9,798	7,492	6,212	5,781	205	2,301	1,077	4,944	4,731	76.4	49.3	80.6
Litchfield,	53,542	12,581	10,635	9,081	8,664	321	1,844	1,261	7,072	6,930	84.5	55.6	78.9
Middlesex,	39,524	8,192	6,760	6,069	5,728	295	1,014	842	5,044	4,658	82.5	59.2	82.2
Tolland,	25,081	5,146	4,553	3,881	3,735	153	679	637	3,217	3,037	88.4	60.7	82.1
The State,	746,258	184,336	147,833	129,084	124,269	4,702	27,049	25,183	106,945	103,059	80.1	56.9	82.8

HARTFORD COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Hartford,	38	38	243	243	$130 06	$58 83	.....	.....	.....	.....	279	6	104	1
Avon,	..	..	8	8	.....	28 75	.....	.....	.....	.....	8	3	..	..
Berlin,	1	1	12	12	40 00	36 79	.....	.....	.....	.....	12	6	9	..
Bloomfield,	1	1	8	8	30 00	31 58	.....	.....	.....	.....	9	2	4	..
Bristol,	4	4	50	50	145 00	47 20	.....	.....	.....	.....	45	9	29	..
Burlington,	..	..	9	9	.....	27 25	.....	.....	.....	.....	9	1	..	2
Canton,	1	1	16	16	160 00	40 00	.....	.....	.....	.....	15	..	4	1
East Granby,	..	..	6	6	.....	26 66	.....	.....	.....	2	5	3	3	..
East Hartford,	3	3	33	33	74 66	34 84	.....	.....	.....	.....	36	7	7	..
East Windsor,	2	2	13	13	80 00	36 00	.....	.....	.....	.....	15	1	7	..
Enfield,	3	3	28	28	83 33	41 98	.....	.....	.....	.....	28	..	13	..
Farmington,	2	2	16	16	114 44	39 75	.....	.....	.....	.....	15	..	8	..
Glastonbury,	2	2	20	20	26 50	30 15	.....	1	.....	1	19	3	2	3
Granby,	..	..	11	11	.....	25 59	.....	2	.....	.....	9	2	1	..
Hartland,	..	..	8	8	.....	20 33	.....	7	.....	1	4	2	3	..
Manchester,	1	1	22	22	136 84	43 48	.....	.....	.....	.....	22	..	..	1
" Ninth District,	2	2	19	19	188 78	66 50	.....	.....	.....	.....	21	80	80	..
" complete,	3	3	41	41	171 46	54 14	.....	.....	.....	.....	43	80	80	1
Marlborough,	..	..	4	4	.....	22 75	.....	1	.....	3	4	..	..	..
New Britain,	9	9	83	84	105 50	44 32	.....	.....	.....	.....	91	1	64	..
Newington,	..	..	4	4	.....	35 33	.....	.....	.....	.....	4	..	1	..
Plainville,	1	1	8	8	115 00	41 25	.....	.....	.....	.....	6	3	3	..
Rocky Hill,	1	1	4	4	34 00	30 50	.....	1	.....	.....	3	..	2	..
Simsbury,	1	1	11	11	61 11	30 54	.....	.....	.....	.....	10	1	4	..
Southington,	1	1	30	30	136 84	45 94	.....	.....	.....	.....	26	5	10	1
South Windsor,	..	..	12	12	.....	39 66	.....	.....	.....	.....	10	2	3	..
Suffield,	2	1	16	17	38 00	35 14	.....	.....	.....	.....	15	3	7	..
West Hartford,	2	2	19	19	108 81	42 62	.....	1	.....	.....	20	1	14	1
Wethersfield,	..	..	10	10	.....	47 26	.....	.....	.....	.....	9	..	9	..
Windsor,	2	2	19	19	80 00	37 37	.....	.....	.....	.....	20	4	9	..
Windsor Locks,	1	1	5	5	123 00	48 00	.....	.....	.....	.....	6	..	..	..
29 Towns.	80	79	747	749	$113 66	$46 40	.....	13	.....	7	775	145	400	10

NEW HAVEN COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
New Haven City,	28	28	373	373	$160 00	$54 00	..	..	..	..	401	16	322	..
" Westville,	1	1	8	8	120 00	50 00	..	..	..	..	9	1	1	..
" South,	..	..	2	2	.....	32 00	..	..	..	.	2	1	..	..
" complete,	29	29	383	383	158 62	53 80	..	..	..	..	412	18	323	..
Ansonia,	..	..	47	49	.....	47 35	..	..	..	..	47	2	15	..
Beacon Falls,	..	..	3	3	.....	29 33	..	..	..	2	3	1	..	..
Bethany,	..	..	5	5	.....	29 60	..	..	..	..	5	2	..	..
Branford,	1	1	22	21	105 25	41 62	..	..	..	1	22	2	10	..
Cheshire,	2	1	12	13	63 33	32 56	..	..	..	3	10	8	2	..
Derby,	2	2	19	19	102 50	47 05	..	..	..	..	21	2	5	..
East Haven,	..	..	5	5	.....	37 60	..	..	..	..	5	1	2	..
Guilford,	1	1	17	17	120 00	32 54	..	..	..	8	18	2	6	..
Hamden,	3	3	18	18	40 00	38 22	..	..	..	..	21	4	..	..
Madison,	1	1	12	12	28 00	30 66	..	..	..	..	9	3	6	3
Meriden,	8	8	97	96	146 25	48 17	..	..	..	..	100	4	28	..
Middlebury,	1	..	3	4	36 00	34 38	..	..	..	..	5	..	3	..
Milford,	1	1	14	14	126 31	37 88	..	..	..	..	15	1	6	..
Naugatuck,	4	4	43	43	117 50	47 83	..	..	..	..	47	..	31	..
North Branford,	1	1	6	6	40 00	32 61	..	..	..	..	5	2	1	..
North Haven,	..	..	10	10	.....	36 59	..	..	..	..	9	..	5	..
Orange,	1	1	32	32	150 00	44 33	..	..	..	..	33	3	17	..
Oxford,	..	..	11	11	.....	24 00	..	..	..	11	2	3	1	..
Prospect,	..	..	4	4	.....	25 00	..	..	..	3	3	1	1	..
Seymour,	2	2	13	13	93 00	39 84	..	..	..	..	15	..	8	..
Southbury,	..	..	9	9	.....	25 11	..	1	..	2	8	1	..	1
Wallingford,	4	4	45	45	115 00	44 06	..	..	..	..	48	3	17	..
Waterbury,	2	2	23	23	50 00	40 00	..	..	..	..	21	3	16	..
" Centre,	8	8	160	160	151 25	53 20	..	..	..	..	160	..	18	..
" complete,	10	10	183	183	131 00	51 54	..	..	..	..	181	3	34	..
Wolcott,	..	..	5	5	.....	26 00	.	..	..	..	4	1	..	..
Woodbridge,	..	..	6	6	.....	36 00	..	..	..	..	5	..	1	..
26 Towns.	71	69	1,024	1,026	$131 47	$48 11	..	1	..	30	1,053	67	522	4

NEW LONDON COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
New London,	2	2	57	57	$105 00	$46 00	..	..	..	..	59	2	10	1
Norwich Town,	1	1	4	4	80 00	35 00	..	..	..	..	5	1	3	..
" Central,	2	2	33	33	135 00	50 00	..	..	..	..	35	1	20	..
" West Chelsea,	1	1	23	23	100 00	34 30	..	..	..	..	24	2	4	..
" Falls District,	1	1	4	4	90 00	40 00	..	..	..	..	5	..	..	..
" other Districts,	4	4	32	32	86 25	36 51	..	..	..	..	36	1	13	..
" complete,	9	9	96	96	98 33	40 69	..	..	..	..	105	5	40	1
Bozrah,	..	..	5	5	.....	27 10	..	..	..	1	5	1	..	..
Colchester,	1	1	15	15	24 12	32 11	..	..	1	7	16	3	3	..
East Lyme,	1	1	10	10	65 00	36 00	..	..	..	..	11	2	5	..
Franklin,	..	..	7	6	.....	24 00	..	..	..	7	6	2	1	..
Griswold,	2	2	22	22	78 05	33 18	..	..	1	9	22	3	12	..
Groton,	4	4	22	21	58 41	38 21	..	..	..	..	25	3	2	..
Lebanon,	3	1	11	13	30 36	28 76	1	..	..	2	10	4	6	..
Ledyard,	3	1	10	13	22 75	20 26	..	11	3	2	13	1	1	..
Lisbon,	1	..	2	3	21 11	23 86	..	..	1	2	1	2	3	..
Lyme,	..	..	7	7	.....	18 12	..	7	..	..	7	2	..	..
Montville,	2	2	15	16	47 50	30 86	..	1	..	7	9	1	3	..
North Stonington,	2	2	11	11	35 00	25 04	..	..	..	9	13	3	3	2
Old Lyme,	2	1	6	7	60 18	29 61	..	..	1	5	7	1	2	1
Preston,	7	7	10	12	34 42	28 51	..	2	3	4	17	2	8	..
Salem,	2	1	5	6	20 58	20 00	1	6	1	..	7	1	1	..
Sprague,	..	..	6	6	.....	36 33	..	1	..	..	4	1	1	..
Stonington,	4	5	34	33	78 52	38 16	..	..	..	2	37	3	13	..
Voluntown,	2	2	7	7	35 00	34 14	..	1	1	3	7	..	2	..
Waterford,	2	2	12	12	36 66	30 96	..	..	..	1	13	3	2	..
21 Towns.	49	43	370	378	$59 01	$35 97	2	29	12	61	394	45	118	5

FAIRFIELD COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Bridgeport,	8	8	187	189	$138 75	$55 00	..	..	..	..	188	10	20	
Danbury,	4	4	70	70	121 25	43 44	..	..	..	..	69	2	2	2
Bethel,	1	1	16	17	95 00	39 12	..	..	..	..	13	2	3	..
Brookfield,	1	1	7	7	32 00	32 10	..	..	..	..	4	1	1	..
Darien,	2	2	6	6	70 00	45 83	..	..	..	..	8	..	3	..
Easton,	..	..	7	7	.....	26 00	..	..	..	..	7	1	1	..
Fairfield,	6	6	13	13	60 00	41 54	..	..	..	..	19	..	..	..
Greenwich,	4	4	41	41	100 00	46 82	..	..	..	..	43	3	21	1
Huntington,	2	2	23	24	77 50	37 73	..	..	..	..	25	3	17	..
Monroe,	..	..	7	7	.....	30 00	..	..	..	..	7	..	..	..
New Canaan,	1	1	17	18	110 00	36 42	..	..	..	..	13	1	..	.
New Fairfield,	1	1	5	5	30 00	28 00	..	..	..	1	6	2	..	1
Newtown,	3	3	17	17	39 58	30 75	..	..	..	..	18	3	2	..
Norwalk,	9	9	67	68	103 77	47 71	..	..	..	..	76	7	32	..
Redding,	1	1	7	7	28 00	24 84	..	..	..	7	8	1	..	..
Ridgefield,	2	2	15	15	61 50	31 98	..	..	..	..	17	3	5	..
Sherman,	1	..	5	6	32 00	23 78	..	..	..	5	5	3	..	..
Stamford,	10	10	70	72	128 66	49 69	..	..	..	..	82	1	37	..
Stratford,	1	1	13	13	120 00	46 55	..	..	..	..	12	1	9	..
Trumbull,	1	1	9	6	42 00	35 53	..	..	..	..	7	2	2	..
Weston,	2	2	3	3	24 00	23 76	..	..	2	3	5	..	..	..
Westport,	1	1	12	12	45 00	41 25	..	..	..	..	13	1	..	..
Wilton,	2	2	7	7	37 50	29 71	..	..	..	..	9	..	1	1
23 Towns.	63	62	624	630	$92 05	$45 84	..	..	2	16	654	47	156	5

WINDHAM COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Brooklyn,	..	..	11	11	.. ...	$39 61	..	..	..	..	11	..	3	..
Ashford,	3	1	5	7	$20 00	21 06	3	7	..	..	..	..	..	..
Canterbury,	..	..	11	11	.....	20 33	..	9	..	2	10	..	..	..
Chaplin,	2	2	1	1	30 39	25 22	..	..	..	..	3	1	..	..
Eastford,	3	2	3	4	19 53	21 07	3	5	..	1	4	4	..	..
Hampton,	1	1	6	5	23 33	22 48	..	..	1	6	5	2	3	..
Killingly,	8	8	27	27	59 42	40 48	..	..	..	..	35	7	4	2
Plainfield,	4	4	19	19	61 42	32 94	..	..	..	..	23	..	3	..
Pomfret,	4	4	4	4	39 46	36 52	..	..	..	..	8	..	2	..
Putnam,	4	4	16	16	82 77	38 62	..	..	..	..	15	..	..	1
Scotland,	..	..	2	2	.....	36 00	..	..	..	..	2	..	2	..
Sterling,	2	2	5	5	31 94	27 73	..	..	..	1	7	2	2	..
Thompson,	1	2	17	16	40 00	36 64	..	..	..	..	14	2	3	1
Windham,	5	5	32	32	108 00	55 93	..	..	..	..	37	1	26	3
Woodstock,	5	4	9	10	28 05	26 90	..	..	1	2	12	3	1	.
15 Towns.	42	39	168	170	$53 65	$37 58	6	21	2	12	186	22	49	7

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Litchfield,	2	2	18	18	$87 50	$33 88	..	..	..	..	20	3	4	1
Barkhamsted,	1	1	10	9	20 00	22 24	2	7	..	1	10	6	1	..
Bethlehem,	..	..	6	5	.....	24 36	..	3	..	2	3	4	1	..
Bridgewater,	..	..	5	5	.....	26 13	..	..	..	5	5	1	..	..
Canaan,	..	..	7	7	.....	26 28	..	..	..	2	5	2	1	1
Colebrook,	3	1	7	8	24 06	22 93	..	1	2	7	10	1	1	..
Cornwall,	3	2	8	9	21 33	22 79	..	..	3	9	8	7	2	..
Goshen,	..	.	8	8	.....	21 12	..	6	..	2	8	2	..	..
Harwinton,	1	1	7	6	25 00	25 20	..	..	1	6	7	2	..	..
Kent,	4	3	8	9	30 57	24 58	..	4	1	1	7	..	2	1
Morris,	..	..	6	5	.....	27 63	..	..	..	..	5	..	1	1
New Hartford,	3	3	11	11	50 00	31 81	..	1	..	..	14	1	1	1
New Milford,	5	3	16	19	57 50	32 45	..	..	..	3	22	4	2	3
Norfolk,	2	2	11	11	43 00	27 45	..	..	1	4	13	3	2	1
North Canaan,	..	..	9	9	.....	33 23	..	..	..	..	9	3	..	..
Plymouth,	1	1	15	15	106 00	37 05	..	..	..	..	13	2	8	..
Roxbury,	1	1	6	5	31 54	24 94	..	..	..	4	7	..	..	1
Salisbury,	2	2	16	17	76 84	33 63	..	1	..	..	17	3	1	..
Sharon,	2	3	16	15	56 00	24 25	1	8	..	4	16	3	2	1
Thomaston,	1	1	13	14	133 33	42 59	..	..	..	..	14	2	5	..
Torrington,	2	2	40	42	150 00	38 60	..	..	..	..	44	4	15	..
Warren,	2	1	3	4	21 33	21 71	1	1	1	3	4	2	..	..
Washington,	1	1	12	11	46 00	25 25	..	..	..	..	12	4	3	..
Watertown,	3	3	12	12	62 96	34 33	..	..	..	..	15	3	6	1
Winchester,	..	..	26	27	.....	53 10	.	..	..	..	19	2	12	..
Woodbury,	1	..	13	14	25 00	27 14	..	..	1	7	13	5	6	.
26 Towns.	40	33	309	315	$55 84	$32 63	4	32	10	60	320	69	76	12

MIDDLESEX COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Middletown,	2	2	32	32	$38 16	$33 34	..	..	..	..	33	..	..	..
" City,	1	1	31	30	90 00	48 90	..	..	..	..	16	5	17	..
" complete,	3	3	63	62	55 44	40 93	..	..	..	..	49	5	17	..
Haddam,	1	1	11	11	66 66	30 37	..	..	..	..	12	..	..	..
Chatham,	1	1	12	12	77 78	28 11	..	1	..	1	13	..	5	..
Chester,	..	..	6	6	.....	39 66	..	..	..	..	5	1	5	..
Clinton,	..	..	2	2	.....	30 00	..	..	..	..	2	..	..	..
Cromwell,	..	..	11	11	.....	34 59	..	..	..	..	10	2	3	..
Durham,	..	..	6	6	.....	41 33	..	..	..	1	6	4	2	..
East Haddam,	3	3	13	12	36 00	27 42	..	1	..	5	14	1	2	..
Essex,	1	1	9	9	43 42	33 26	..	..	..	..	10	..	3	..
Killingworth,	..	..	8	8	.....	23 39	..	2	..	4	8	2	1	..
Middlefield,	..	..	5	5	.....	32 60	..	..	..	1	5	2	1	..
Old Saybrook,	1	1	5	5	115 00	42 00	..	..	..	..	6	..	4	..
Portland,	3	3	17	17	106 66	40 23	..	..	..	..	20	3	5	..
Saybrook,	1	1	6	6	100 00	36 66	..	..	..	..	6	..	2	..
Westbrook,	3	3	2	2	29 66	27 50	..	..	1	2	6	2	..	..
15 Towns.	17	17	176	174	$63 89	$36 10	..	4	1	14	172	22	50	..

TOLLAND COUNTY

TOWNS.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Tolland,	3	3	8	8	$26 00	$26 75	..	..	..	..	11	6	2	..
Andover,	..	..	1	1	.....	40 00	..	..	..	..	1	..	..	..
Bolton,	..	..	4	4	.....	24 58	..	..	..	3	4	1	2	..
Columbia,	1	2	5	4	20 86	21 76	..	2	1	4	4	3	..	1
Coventry,	5	3	7	9	32 54	29 67	..	..	..	2	10	3	6	..
Ellington,	2	2	9	9	34 00	36 44	..	..	..	..	5	..	..	..
Hebron	1	..	8	9	32 00	24 61	..	..	..	6	7	3	1	..
Mansfield,	1	1	12	12	27 07	26 56	..	..	1	1	13	3	8	1
Somers,	3	2	9	10	38 00	32 52	..	..	..	1	11	3	2	1
Stafford,	2	2	23	24	71 55	37 76	..	..	..	4	24	..	4	..
Union,	..	..	6	6	.....	20 00	..	6	..	..	2	7	..	..
Vernon,	3	3	39	39	125 00	39 89	..	..	..	..	41	1	18	4
Willington,	2	1	7	7	25 33	22 48	1	4	1	2	5	2	1	..
13 Towns.	23	19	138	142	$47 69	$32 65	1	12	3	23	138	32	44	7

SUMMARY BY COUNTIES

COUNTIES.	Male.		Female.		Average Wages per month.		No. of teachers whose average wages was $20 or less per mo.		No. of teachers whose av. wages was from $20 to $25 per month.		Continuously employed.	Beginners.	Attended Normal School.	No. of Teachers' Meetings.
	Winter.	Summer.	Winter.	Summer.	Male.	Female.	Male.	Female.	Male.	Female.				
Hartford,	80	79	747	749	$113 66	$46 40	..	13	..	7	775	145	400	10
New Haven,	71	69	1,024	1,026	131 47	48 11	..	1	..	30	1,053	67	522	4
New London,	49	43	370	378	59 01	35 97	2	29	12	61	394	45	118	5
Fairfield,	63	62	624	630	92 05	45 84	..	..	2	16	654	47	156	5
Windham,	42	39	168	170	53 65	37 58	6	21	2	12	186	22	49	7
Litchfield,	40	33	309	315	55 84	32 63	4	32	10	60	320	69	76	12
Middlesex,	17	17	176	174	63 89	36 10	..	4	1	14	172	22	50	..
Tolland,	23	19	138	142	47 69	32 65	1	12	3	23	138	32	44	7
The State.	385	361	3,556	3,584	$88 49	$43 03	13	112	30	223	3,692	449	1,415	50

SCHOOLS, SCHOOLHOUSES, AND LIBRARIES

HARTFORD COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Hartford,	9	20	211	9,274	1	..	1	1	13	..	1	189.40	2
Avon,	7	7	8	279	1	..	..	..	..	1	..	184.00	..
Berlin,	9	9	13	528	3	..	..	..	.	..	..	180.00	..
Bloomfield,	8	8	9	218	1	..	..	..	..	1	..	180.00	..
Bristol,	11	12	40	1,931	1	1	2	..	2	..	1	192.90	..
Burlington,	9	9	9	278	..	..	..	..	..	..	..	180.00	..
Canton,	8	8	15	655	2	..	..	..	1	..	..	187.96	..
East Granby,	6	6	6	131	..	..	..	..	..	2	..	178.80	..
East Hartford,	10	11	32	1,288	2	2	..	..	3	1	1	180.00	..
East Windsor,	1	8	16	654	1	1	..	..	1	..	.	180.00	..
Enfield,	1	7	29	1,204	2	..	2	1	1	..	1	190.00	..
Farmington,	7	6	17	780	..	..	1	..	1	1	..	186.41	..
Glastonbury,	18	18	21	706	3	..	..	..	..	3	..	179.90	..
Granby,	10	10	11	361	1	..	..	..	.	2	..	180.00	..
Hartland,	8	8	8	240	..	..	..	..	..	5	..	180.00	..
Manchester,	8	8	22	891	6	..	..	..	1	..	..	190.00	..
" Ninth District,	1	1	35	1,200	..	..	..	..	1	..	..	190.00	..
" complete,	9	9	57	2,091	6	..	..	..	2	..	..	190.00	..
Marlborough,	4	4	4	116	..	..	.	..	..	1	..	187.50	..
New Britain,	1	12	77	3,582	..	1	2	..	9	..	1	184.00	1
Newington,	4	4	4	164	..	..	..	..	..	..	..	177.75	..
Plainville,	1	1	9	436	..	..	..	..	..	..	..	200.00	..
Rocky Hill,	4	4	5	200	1	..	..	..	..	..	..	178.80	..
Simsbury,	1	12	12	380	..	..	..	..	..	1	..	180.00	..
Southington,	1	12	31	1,229	1	1	..	1	1	..	1	185 96	..
South Windsor,	10	12	12	398	..	..	..	..	..	1	2	178 37	..
Suffield,	11	11	18	593	5	1	..	..		..	..	179.33	..
West Hartford,	1	8	19	530	3	..	2	..	..	..	1	185.00	..
Wethersfield,	6	7	9	446	..	1	..	..	..	..	1	190.00	..
Windsor,	10	11	19	798	2	..	2	..	..	..	1	178.63	..
Windsor Locks,	1	1	5	253	..	..	..	1	..	..	..	195.00	.
29 Towns.	186	255	726	29,743	36	8	12	4	34	19	11	186.28	3

HARTFORD COUNTY

TOWNS.	SCHOOLHOUSES.					LIBRARIES.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Hartford,	20	..	1	$135,000 00	$1,705,600 00	17	10,266	8	$530 00	2
Avon,	7	1	..	.....	6,000 00	..	....	..	.....	1
Berlin,	10	2	..	.....	13,000 00	7	967	3	15 00	2
Bloomfield,	8	..	..	.....	5,200 00	8	510	8	40 00	..
Bristol,	13	..	..	.....	105,700 00	12	6,060	12	130 00	1
Burlington,	9	1	..	.....	2,650 00	4	86	3	25 00	1
Canton,	8	..	..	.....	20,800 00	2	450	3	35 00	..
East Granby,	6	1	..	.....	2,100 00	1	52	1	5 00	..
East Hartford,	14	..	2	13,000 00	48,800 00	6	650	11	105 00	1
East Windsor,	8	..	..	.....	15,800 00	8	200	1	70 00	1
Enfield,	10	..	..	.....	80,000 00	6	1,600	1	95 00	1
Farmington,	9	..	..	.....	31,850 00	3	400	2	35 00	1
Glastonbury,	20	1	..	.....	17,750 00	12	830	3	15 00	1
Granby,	10	..	..	.....	6,900 00	2	50	2	10 00	3
Hartland,	8	2	..	.....	2,100 00	..	....	..	.....	..
Manchester,	8	1	..	.....	33,500 00	8	4,672	8	60 00	..
" Ninth Dist.,	1	..	..	.....	77,000 00	6	6,650	..	.....	1
" complete,	9	1	..	.....	110,500 00	14	11,322	8	60 00	1
Marlborough,	4	..	1	600 00	2,300 00	1	37	..	.....	..
New Britain,	12	..	1	15,000 00	423,000 00	2	1,000	1	370 00	1
Newington,	4	..	..	.....	4,200 00	4	336	4	20 00	1
Plainville,	1	..	..	.....	10,000 00	1	58	1	20 00	1
Rocky Hill,	4	2	..	.....	3,300 00	4	222	1	5 00	1
Simsbury,	12	..	1	1,500 00	21,800 00	1	30	1	5 00	1
Southington,	12	..	..	.....	41,105 91	2	300	1	100 00	..
South Windsor,	11	1	..	.....	8,950 00	12	1,672	12	60 00	..
Suffield,	11	..	..	.....	24,900 00	7	768	..	.....	1
West Hartford,	8	..	..	.....	50,000 00	7	500	..	.....	1
Wethersfield,	7	..	..	.....	34,500 00	7	1,203	7	40 00	1
Windsor,	10	..	..	.....	37,300 00	17	500	6	35 00	1
Windsor Locks,	1	..	..	.....	25,000 00	1	500	1	15 00	1
29 Towns.	266	12	6	$165,100 00	$2,861,105 91	168	40,569	101	$1,840 00	26

NEW HAVEN COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments	4 Departments.	5 Departments.	6 or more Departments.				
New Haven City,	1	47	344	15,725	1	1	7	1	25	..	1	200.00	7
" Westville,	1	1	8	400	..	..	..	..	1	..	..	200.00	..
" South,	1	1	2	70	1	..	..	..	..	..	..	177.50	..
" complete,	3	49	354	16,195	2	1	7	1	26	..	1	199 87	7
Ansonia,	1	7	47	2,464	..	..	1	..	5	..	1	195.00	1
Beacon Falls,	1	2	3	94	1	..	..	..	..	..	..	186.66	..
Bethany,	5	5	5	130	..	..	..	.	..	..	..	185.00	..
Branford,	1	8	20	1,009	2	..	2	..	1	1	1	179.90	..
Cheshire,	12	13	14	425	1	..	..	..	..	1	1	182.52	..
Derby,	1	5	16	881	..	..	2	..	1	..	1	195.00	..
East Haven,	2	2	5	171	..	..	1	..	..	..	.	195.00	..
Guilford,	10	11	20	735	2	..	1	..	..	4	1	186.25	..
Hamden,	1	13	21	819	3	1	1	..	..	..	..	190.00	..
Madison,	1	13	13	343	..	..	..	..	..	1	1	180 00	..
Meriden,	1	19	94	4,488	2	2	2	..	8	..	1	200.00	1
Middlebury,	6	4	4	146	..	..	..	..	..	.	..	177 50	.
Milford,	1	5	14	561	..	..	..	.	1	..	..	190.00	..
Naugatuck,	6	11	41	2,031	1	1	3	.	3	..	..	200.00	..
North Branford,	7	6	7	193	1	..	..	..	..	1	..	178.57	..
North Haven,	8	7	10	352	1	1	..	..	..	..	..	180.00	..
Orange,	8	8	30	1,154	1	..	1	..	1	..	..	189.00	..
Oxford,	12	11	11	294	..	..	..	..	..	4	..	179.27	..
Prospect,	1	4	4	98	..	..	..	..	..	1	..	153.75	..
Seymour,	1	6	14	751	..	..	..	..	1	..	1	192.03	..
Southbury,	9	9	9	249	..	..	..	..	..	1	..	164.33	.
Wallingford,	9	13	44	1,671	1	..	1	..	3	.	..	193.28	..
Waterbury,	10	10	24	1,073	4	1	..	1	1	..	..	198 50	..
" Center,	1	16	127	5,919	..	1	3	..	12	..	1	203.00	2
" complete,	11	26	151	6,992	4	2	3	1	13	..	1	202.28	2
Wolcott,	1	5	5	150	..	..	..	..	..	..	..	200.00	..
Woodbridge,	1	6	6	214	..	..	..	..	..	1	..	180.00	..
26 Towns.	120	268	962	42,610	22	8	25	2	63	15	10	196.14	11

NEW HAVEN COUNTY

TOWNS	Schoolhouses.					Libraries.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. of Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
New Haven City,	47	1	..	.....	$1,492,387 36	15	24,000	..	.....	2
" Westville,	1	..	..	.....	25,000 00	1	800	1	$20 00	..
" South,	1	..	..	.....	4,000 00	..	....	..	.....	..
" complete,	49	1	..	.....	1,521,387 36	16	24,800	1	20 00	2
Ansonia,	6	2	..	.....	110,000 00	3	2,500	1	120 00	1
Beacon Falls,	3	.	..	.....	4,500 00	1	25	..	.....	..
Bethany,	5	..	1	$1,000 00	2,500 00	5	240	5	25 00	..
Branford,	9	1	..	.....	51,300 00	1	800	1	50 00	1
Cheshire,	13	..	..	.....	9,900 00	4	200	1	5 00	1
Derby,	4	..	..	.....	57,000 00	3	1,375	..	.....	..
East Haven,	2	..	..	.....	12,000 00	3	190	2	15 00	..
Guilford,	14	2	..	.....	14,600 00	..	....	4	35 00	1
Hamden,	13	1	..	.....	19,500 00	13	775	1	70 00	..
Madison,	12	..	1	425 00	10,275 00	10	518	1	70 00	2
Meriden,	19	3	..	.....	218,650 00	14	5,000	1	270 00	..
Middlebury,	4	..	1	4,000 00	4,900 00	1	10	..	.....	1
Milford,	5	..	..	.....	30,000 00	1	533	1	60 00	1
Naugatuck,	11	1	..	.....	207,000 00	2	2,250	2	70 00	1
North Branford,	7	1	..	.....	4,550 00	2	56	..	... .	..
North Haven,	7	1	..	.....	6,700 00	7	800	7	35 00	1
Orange,	11	1	..	.....	47,400 00	2	843	2	55 00	..
Oxford,	11	2	..	.....	3,950 00	4	20	2	10 00	1
Prospect,	4	2	..	.....	1,175 00	2	70	..	.....	1
Seymour,	7	..	..	....	53,600 00	1	455	1	35 00	1
Southbury,	9	2	..	.....	3,200 00	..	....	2	15 00	..
Wallingford,	11	2	..	.....	102,200 00	2	632	9	120 00	1
Waterbury,	10	1	..	.....	47,400 00	10	500	1	15 00	..
" Center,	15	..	..	.....	620,374 00	16	600	1	320 00	1
" complete,	25	1	..	.....	667,774 00	26	1,100	2	335 00	1
Wolcott,	5	..	.	.....	2,000 00	1	50	..	.....	..
Woodbridge,	6	..	..	.....	4,400 00	6	1,945	1	30 00	..
26 Towns.	272	23	3	$5,425 00	$3,170,461 36	130	45,187	47	$1,445 00	17

NEW LONDON COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
New London,.....	1	6	55	2,492	1	..	..	..	5	..	..	188.00	..
Norwich Town,.....	1	1	5	239	..	..	..	1	..	..	..	195.00	..
" Central,.....	1	6	28	1,260	..	1	2	..	2	..	..	200.00	..
" West Chelsea,....	1	4	20	1.018	..	..	2	1	1	..	..	200.00	..
" Falls District,...	1	1	5	213	..	..	1	..	..	..	..	200.00	..
" other Districts,...	8	8	31	1,431	2	..	..	..	2	3	..	195.29	2
" complete,.....	12	20	89	4,161	2	1	5	2	5	3	..	198.07	2
Bozrah,.....	7	5	5	270	..	..	..	..	..	1	..	180.00	..
Colchester, ...	12	11	16	614	1	..	1	..	..	5	..	185.93	..
East Lyme,.....	1	6	11	450	..	1	1	..	..	..	..	180.00	..
Franklin, ...	1	7	7	180	..	..	..	..	..	..	..	180 00	..
Griswold,.....	14	11	23	842	1	..	..	..	1	4	..	190 43	..
Groton,.....	11	11	26	1,150	2	..	..	2	1	1	..	180.00	..
Lebanon,.....	16	14	14	544	..	..	..	..	..	2	..	177.14	..
Ledyard,.....	14	14	14	350	..	..	..	..	..	4	..	180.00	..
Lisbon, ...	6	3	3	100	..	..	..	..	..	..	..	166.66	..
Lyme,.....	7	7	7	256	..	..	..	..	.	1	..	180.00	..
Montville, ...	12	12	18	761	..	1	..	1	..	1	..	183.05	..
North Stonington,...	15	13	13	422	..	..	..	..	..	1	..	180.00	..
Old Lyme,.....	1	6	8	245	..	1	..	..	..	1	..	165.00	..
Preston, ...	11	11	17	638	1	1	1	..	..	1	..	183.52	..
Salem,.....	7	7	7	154	..	..	..	..	..	3	..	180.00	..
Sprague,.....	5	5	6	385	1	..	..	..	..	1	..	154.00	..
Stonington,.....	15	14	34	1,463	1	1	1	..	2	2	..	178.23	..
Voluntown,.....	8	7	9	332	..	1	..	..	..	4	..	166.66	..
Waterford,..... ...	11	11	14	504	3	..	..	..	..	..	..	178.57	..
21 Towns.	187	201	396	16,313	13	7	9	5	14	35	..	184.95	2

NEW LONDON COUNTY

TOWNS.	Schoolhouses.					Libraries.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
New London,	6	..	..	.....	$300,000 00	6	4,637	1	$120 00	1
Norwich Town,	2	..	..	.....	10,000 00	1	100	..	.....	..
" Central,	6	..	..	.....	170,000 00	1	467	1	50 00	1
" West Chelsea,	4	..	..	.....	60,000 00	4	1,169	..	.....	..
" Falls District,	1	..	..	.....	15,000 00	1	183	..	.....	..
" other Districts,	10	..	..	.....	86,600 00	2	1,300	2	45 00	..
" complete,	23	..	..	.....	341,600 00	9	3,219	3	95 00	1
Bozrah,	7	..	..	.....	7,100 00	..	....	..	.....	..
Colchester,	11	5	..	.....	5,200 00	9	600	8	40 00	1
East Lyme,	6	..	1	$575 61	7,500 00	2	250	1	25 00	1
Franklin,	7	..	..	.....	3,000 00	..	....	..	.....	1
Griswold,	14	2	..	.....	34,000 00	2	300	1	35 00	2
Groton,	11	..	..	.....	27,000 00	6	375	4	45 00	2
Lebanon,	16	2	..	.....	10,900 00	..	...	3	15 00	1
Ledyard,	14	1	..	.....	3,500 00	..	....	..	.....	1
Lisbon,	4	1	..	.....	1,850 00	..	....	..	.....	1
Lyme,	7	2	..	.....	1,875 00	1	20	..	.....	..
Montville,	13	2	1	30,000 00	10,500 00	4	600	1	15 00	1
North Stonington,	15	..	..	.....	9,100 00	13	497	1	5 00	..
Old Lyme,	6	4	..	.....	8,330 00	1	50	1	40 00	1
Preston,	11	..	..	.....	13,400 00	4	200	..	.....	..
Salem,	7	1	..	.....	3,700 00	2	63	2	10 00	..
Sprague,	5	..	..	.....	6,100 00	3	485	1	5 00	..
Stonington,	15	..	..	.....	64,800 00	5	1,800	4	45 00	1
Voluntown,	7	..	..	.....	4,900 00	2	100	2	20 00	..
Waterford,	11	3	..	.....	6,700 00	4	25	..	.....	..
21 Towns.	216	23	2	$30,575 61	$871,055 00	73	13,221	32	$515 00	15

FAIRFIELD COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Bridgeport,	1	20	183	9,215	1	3	1	..	15	..	1	195.00	2
Danbury,	13	19	71	3,311	2	1	1	..	5		1	197.67	1
Bethel,	1	7	18	770	1	..	..	1	1	..	1	197.00	..
Brookfield,	8	8	8	312	..	..	.	..	..	1	..	180.12	..
Darien,	4	4	8	324	..	2	..	..	..	..	..	200.00	..
Easton,	1	6	7	190	1	..	..	..	..	..	.	180.00	..
Fairfield,	1	12	19	850	1	3	..	..	..	..	.	200.00	..
Greenwich,	20	20	43	2,001	4	1	..	..	2	..	..	200.00	..
Huntington,	1	10	24	1,013	..	..	..	..	1	1	..	192.50	..
Monroe,	7	7	7	262	..	..	..	..	..	..	..	180.00	..
New Canaan,	1	11	18	650	..	.	..	..	1		..	200 00	..
New Fairfield,	6	6	6	158	..	..	..	..	..	1	..	180 00	..
Newtown,	21	19	20	688	1	.	.	..	..	4	..	183.45	..
Norwalk,	11	11	64	3,310	2	1	1	..	4	..	..	202.00	1
Redding,	10	8	8	255	..	..	..	..	..	1	..	181.25	..
Ridgefield,	14	14	17	554	1	1	..	..	..	..	..	200.00	..
Sherman,	6	6	6	155		..	..	..	..	3	..	179.66	..
Stamford,	1	20	81	3,336	1	1	..	..	6	..	1	195.50	1
Stratford,	3	3	12	575	..	..	..	..	1	..	..	200.00	..
Trumbull,	1	7	7	254	..	..	..	..	..	..	..	190.00	..
Weston,	5	5	5	190	..	..	..	..	..	..	..	199.00	..
Westport,	10	10	13	562	3	..	..	..	..	..	..	200.00	..
Wilton,	10	9	10	255	1	..	..	..	.	2	..	200.00	..
23 Towns.	156	242	655	29,190	19	13	3	1	36	13	4	195.74	5

FAIRFIELD COUNTY

TOWNS.	Schoolhouses.					Libraries.				
	Number.	Number Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Bridgeport,	21	2	1	$60,000 00	$713,643 80	3	1,311	1	$430 00	1
Danbury,	20	2	..	.....	201,100 00	4	1,198	3	145 00	1
Bethel,	7	..	..	.....	45,000 00	1	336	1	50 00	..
Brookfield,	8	..	..	.....	1,275 00	1	25	..	.....	..
Darien,	4	..	..	.....	9,800 00	2	415	3	20 00	..
Easton,	6	1	1	1,000 00	2,850 00	4	106	1	10 00	..
Fairfield,	12	..	..	.....	32,000 00	9	433	1	85 00	3
Greenwich,	20	..	..	.....	255,700 00	9	1,923	6	70 00	2
Huntington,	12	1	..	.....	50,850 00	3	350	1	35 00	1
Monroe,	7	..	..	.....	5,300 00	..	....	..	.....	1
New Canaan,	11	..	..	.....	10,000 00	10	350	..	.....	1
New Fairfield,	6	1	..	.....	1,700 00	..	....	1	5 00	1
Newtown,	21	..	..	.....	9,100 00	18	300	..	.....	1
Norwalk,	13	..	1	18,000 00	175,000 00	10	4,442	6	130 00	2
Redding,	9	..	..	.....	3,600 00	3	88	..	.....	..
Ridgefield,	14	..	1	1,200 00	15,450 00	14	1,200	7	40 00	1
Sherman,	6	2	..	.....	1,950 00	..	....	..	.....	..
Stamford,	20	2	1	11,000 00	235,000 00	7	2,000	1	185 00	1
Stratford,	3	..	1	5,000 00	25,800 00	3	200	1	25 00	1
Trumbull,	7	..	..	.....	4,400 00	6	321	1	35 00	..
Weston,	5	1	..	.....	1,800 00	..	....	..	.....	..
Westport,	10	..	..	.....	11,100 00	7	521	10	55 00	1
Wilton,	9	..	..	.....	6 100 00	6	280	..	.....	1
23 Towns.	251	12	6	$96,200 00	$1,818,518 80	120	15,799	44	$1,320 00	1

WINDHAM COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Brooklyn,	1	7	11	382	..	2	..	..	..	1	..	178.18	..
Ashford,	10	8	8	232	..	..	..	..	..	2	..	120.00	..
Canterbury,	11	11	11	418	..	..	..	..	..	3	..	165.91	..
Chaplin,	1	3	3	126	..	..	..	..	..	..	..	180.00	..
Eastford,	8	6	6	190	..	..	..	..	..	2	..	180.00	..
Hampton,	7	7	7	168	..	..	..	..	..	..	..	159.71	..
Killingly,	15	13	33	1,244	2	3	1	..	1	3	..	187.57	..
Plainfield,	11	8	23	1,150	1	1	..	..	2	..	..	188.69	..
Pomfret,	8	8	8	231	..	..	..	..	..	1	..	180.00	..
Putnam,	1	7	20	819	1	2	..	..	1	..	1	183.00	..
Scotland,	1	1	2	108	1	..	..	..	..	..	..	180.00	..
Sterling,	8	7	7	252	..	..	..	..	..	1	..	179.14	..
Thompson,	13	13	18	805	3	..	1	..	..	..	..	180 00	..
Windham,	1	8	35	1,416	1	2	..	1	2	..	1	194.75	..
Woodstock,	16	14	14	504	..	..	..	..	..	2	..	180.00	..
15 Towns.	112	121	206	8,045	9	10	2	1	6	15	2	181.08	..

WINDHAM COUNTY

TOWNS.	SCHOOLHOUSES.					LIBRARIES.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Brooklyn,	7	..	..	.....	$16,450 00	9	....	1	$25 00	1
Ashford,	10	1	..	.....	4,025 00	..	...	..	.....	1
Canterbury,	11	..	..	.....	4,200 00	..	....	..	.....	..
Chaplin,	3	..	..	.....	2,750 00	3	175	..	.....	..
Eastford,	6	..	..	.....	1,975 00	1	156	..	.....	1
Hampton,	7	1	..	.....	1,800 00	1	16	..	.....	1
Killingly,	15	1	..	.....	55,950 00	14	1,000	15	115 00	1
Plainfield,	8	1	..	.....	31,215 00	8	525	1	10 00	3
Pomfret,	8	..	..	.....	5,800 00	8	380	8	40 00	2
Putnam,	8	..	..	.....	25,000 00	3	800	1	5 00	1
Scotland,	1	..	..	.....	3,000 00	1	....	..	.....	1
Sterling,	7	2	1	$725 00	3,025 00	4	185	..	.....	..
Thompson,	13	..	..	.....	14,975 00	10	430	1	5 00	1
Windham,	12	1	..	.....	96,741 00	10	5,877	1	75 00	2
Woodstock,	16	..	..	.....	7,600 00	..	....	1	5 00	1
15 Towns.	132	7	1	$725 00	$274,506 00	72	9,544	29	$280 00	16

LITCHFIELD COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Litchfield,	1	13	20	750	3	..	..	..	1	..	..	180.00	..
Barkhamsted,	10	10	10	261	..	..	..	..	..	3	..	180.00	..
Bethlehem,	7	7	7	166	..	..	..	..	..	3	..	115.71	..
Bridgewater,	5	4	5	178	1	..	..	..	..	..	..	180.00	..
Canaan,	7	7	7	169	..	..	..	..	..	1	..	179.85	..
Colebrook,	9	9	9	291	..	..	..	..	..	2	..	180.00	..
Cornwall,	1	11	11	330	..	..	..	..	..	..	..	160.81	..
Goshen,	10	8	8	246	..	..	..	..	..	3	..	172.50	..
Harwinton,	1	8	8	326	..	..	..	..	..	1	..	165.00	..
Kent,	13	12	12	430	..	..	..	..	..	4	..	180.83	..
Morris,	6	6	6	190	..	..	..	..	..	1	..	153.33	..
New Hartford,	9	10	14	435	2	1	..	..	..	3	..	184.35	..
New Milford,	1	16	22	894	..	..	..	..	1	1	..	174.09	..
Norfolk,	11	10	13	342	1	1	..	..	..	3	..	167.23	..
North Canaan,	5	5	9	320	1	..	1	..	.	..	..	179.88	..
Plymouth,	8	8	15	615	..	1	1	..	..	..	..	186.00	..
Roxbury,	7	7	7	214	..	..	..	..	..	3	..	166.14	..
Salisbury,	13	11	19	732	3	1	1	..	..	1	..	178.89	..
Sharon,	17	17	18	480	1	..	..	..	.	7	1	180.00	..
Thomaston,	1	3	14	800	1	..	..	..	1	..	1	180.00	..
Torrington,	1	10	35	1,450	2	..	..	..	3	..	1	200.00	..
Warren,	7	5	5	162	..	..	..	..	..	..	..	171.00	..
Washington,	1	12	13	386	1	..	..	..	..	..	..	159.26	..
Watertown,	9	9	15	503	1	..	..	..	1	..	..	180.00	..
Winchester,	8	8	23	1,118	..	..	..	..	2	1	1	190.00	..
Woodbury,	1	14	14	410	1	..	..	..	..	1	..	180.00	..
26 Towns.	169	240	339	12,198	18	4	3	..	9	38	4	178.11	..

LITCHFIELD COUNTY

TOWNS.	Schoolhouses.					Libraries.				
	Number.	Number Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Litchfield,	17	..	..	.....	$30,450 00	2	850	..	.....	3
Barkhamsted,	10	..	..	.....	3,700 00	1	85	..	.....	..
Bethlehem,	7	3	..	.....	2,100 00	1	30	..	.....	1
Bridgewater,	5	..	..	.....	1,850 00	2	117	..	.....	..
Canaan,	7	..	..	.....	2,600 00	3	81	1	$5 00	1
Colebrook,	9	..	..	.....	6,200 00	1	....	1	5 00	..
Cornwall,	13	6	..	.....	5,500 00	2	40	..	.. ..	1
Goshen,	7	1	..	.....	1,400 00	3	75	2	20 00	..
Harwinton,	11	..	..	.....	5,800 00	..	....	..	.....	..
Kent,	12	2	..	.....	3,950 00	..	....	4	25 00	..
Morris,	6	1	..	.....	3,300 00	2	350	..	....	1
New Hartford,	10	2	..	.....	17,000 00	3	350	3	15 00	..
New Milford,	18	..	1	$900 00	22,250 00	6	1,100	1	50 00	2
Norfolk,	11	1	..	.....	8,675 00	1	380	7	40 00	1
North Canaan,	5	..	..	.....	4,900 00	2	100	..	.....	1
Plymouth,	9	..	..	.....	10,400 00	8	1,292	8	55 00	2
Roxbury,	7	..	..	.....	2,300 00	2	76	1	5 00	1
Salisbury,	13	1	..	.....	13,100 00	11	700	13	75 00	1
Sharon,	17	1	..	.....	6,775 00	3	65	..	.....	2
Thomaston,	6	..	..	.....	27,000 00	1	235	1	35 00	1
Torrington,	10	..	..	.....	125,000 00	3	3,500	1	75 00	1
Warren,	6	1	..	.....	4,300 00	5	250	..	.....	..
Washington,	12	..	..	.....	8,440 00	5	225	1	15 00	1
Watertown,	9	..	..	.....	16,900 00	4	150	3	25 00	1
Winchester,	9	..	..	.....	35,000 00	6	1,838	..	.....	1
Woodbury,	14	1	..	.....	8,925 00	1	50	1	5 00	1
26 Towns.	260	20	1	$900 00	$377,815 00	78	11,939	48	$450 00	23

MIDDLESEX COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Middletown,	18	18	34	1,130	2	..	1	..	2	1	..	181.38	..
" City,	1	5	30	1,476	1	..	..	..	3	..	1	184.00	..
" complete,	19	23	64	2,606	3	..	1	..	5	1	1	182.60	..
Haddam,	9	9	12	418	..	..	1	..	..	..	..	180.00	..
Chatham,	10	10	13	449	..	..	1	..	..	1	..	180.00	..
Chester,	1	4	6	246	2	..	..	..	..	..	..	180.00	..
Clinton,	1	2	2	46	..	..	..	.	..	1	..	177.50	..
Cromwell,	1	6	11	416	5	..	..	..	..	..	..	180.00	..
Durham,	5	5	6	201	1	..	..	..	..	..	..	185.00	..
East Haddam,	17	16	17	638	1	..	..	..	..	2	..	172.05	..
Essex,	1	5	9	370	2	..	..	..	..	..	..	190.00	..
Killingworth,	1	8	8	185	..	..	..	..	..	5	..	180.00	..
Middlefield,	4	4	4	194	..	..	..	..	..	1	..	179.00	..
Old Saybrook,	1	1	5	275	..	..	..	..	..	..	..	190.00	..
Portland,	6	6	16	753	1	1	..	..	1	..	..	200.00	..
Saybrook,	1	3	7	310	1	..	..	1	..	..	1	190.00	..
Westbrook,	1	5	5	180	..	..	..	..	..	1	..	192.00	..
15 Towns.	78	107	185	7,287	16	1	3	1	6	12	2	183.47	..

MIDDLESEX COUNTY

TOWNS.	SCHOOLHOUSES.					LIBRARIES.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Middletown,	17	..	..	.....	$24,650 00	6	400	4	$25 00	..
" City,	4	..	..	.....	125,000 00	2	600	1	65 00	1
" complete,	21	..	..	.....	149,650 00	8	1,000	5	90 00	1
Haddam,	9	1	..	.....	12,400 00	..	....	1	10 00	1
Chatham,	11	1	..	.....	10,250 00	3	180	1	5 00	1
Chester,	4	..	..	.....	6,400 00	3	250	..	.....	1
Clinton,	3	1	..	.....	1,600 00	2	30	..	.....	1
Cromwell,	5	1	..	.....	5,400 00	6	701	1	30 00	1
Durham,	5	..	..	.....	3,800 00	2	150	..	.....	1
East Haddam,	16	..	..	.....	11,000 00	7	182	2	10 00	1
Essex,	4	..	..	.....	7,000 00	8	296	1	30 00	3
Killingworth,	8	..	..	.....	2,600 00	..	....	1	60 00	..
Middlefield,	4	..	..	.....	5,650 00	4	580	..	.....	1
Old Saybrook,	1	..	..	.....	4,000 00	1	325	1	25 00	1
Portland,	6	..	..	.....	39,600 00	4	1,351	3	35 00	1
Saybrook,	2	..	..	.....	12,000 00	1	750	1	20 00	1
Westbrook,	6	..	..	.....	2,800 00	..	....	..	.....	1
15 Towns.	105	4	..	.....	$274,150 00	49	5,795	17	$315 00	16

TOLLAND COUNTY

TOWNS.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Tolland,	12	11	11	270	..	..	..	..	..	..	..	180 00	..
Andover,	1	1	1	35	..	..	..	..	..	..	..	178.00	..
Bolton,	5	4	4	122	..	..	..	..	..	1	..	180.00	..
Columbia,	8	6	6	254	..	..	..	..	..	..	..	176.66	..
Coventry,	10	10	12	430	..	1	..	..	..	2	..	175.00	..
Ellington,	10	8	11	368	1	1	..	..	..	..	..	180.00	..
Hebron,	10	9	9	253	..	..	..	..	..	1	..	180.00	..
Mansfield,	14	14	14	457	..	..	..	..	..	2	..	167.21	..
Somers,	10	10	12	338	..	1	..	..	..	2	1	175.83	.
Stafford,	15	13	26	976	1	1	1	..	1	2	..	175.38	..
Union,	6	6	6	236	..	..	..	..	..	2	..	180.00	..
Vernon,	9	12	38	1,612	..	2	2	1	1	1	1	181.15	..
Willington,	9	9	9	275	..	..	..	..	..	2	..	160.00	..
13 Towns.	119	113	159	5,626	2	6	3	1	2	15	2	176.43	..

TOLLAND COUNTY

TOWNS.	SCHOOLHOUSES.					LIBRARIES.				
	Number.	No. Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Tolland,	11	..	..	.....	$4,700 00	3	500	..	.....	..
Andover,	1	..	..	.....	300 00	..	....	..	.....	1
Bolton,	4	..	..	.....	2,850 00	1	60	..	.....	1
Columbia,	7	2	..	.....	3,900 00	..	....	..	.....	1
Coventry,	10	..	..	.....	11,450 00	8	493	5	$30 00	2
Ellington,	8	..	..	.....	19,300 00	8	378	..	.....	1
Hebron,	10	1	..	.....	4,550 00	5	114	1	5 00	1
Mansfield,	14	2	..	.....	7,200 00	11	459	6	30 00	.
Somers,	9	1	..	.....	7,100 00	1	25	..	.....	1
Stafford,	15	2	..	.....	37,860 00	4	1,560	..	.....	1
Union,	6	..	..	.....	2,900 00	6	225	.	.....	1
Vernon,	11	..	..	.....	126,900 00	3	600	3	65 00	2
Willington,	9	..	..	.....	3,300 00	3	30	1	10 00	..
13 Towns.	115	8	..	.....	$232,310 00	53	4,444	16	$140 00	12

SUMMARY BY COUNTIES

COUNTIES.	Districts.	Number of Schools.	Departments.	Number of Sittings.	Graded Schools.					Schools averaging 8 or less.	High Schools.	Average length in days.	Evening Schools.
					2 Departments.	3 Departments.	4 Departments.	5 Departments.	6 or more Departments.				
Hartford,.....	186	255	726	29,743	36	8	12	4	34	19	11	186.28	3
New Haven, ...	120	268	962	42,610	22	8	25	2	63	15	10	196.14	11
New London,.....	187	201	396	16,313	13	7	9	5	14	35	..	184.95	2
Fairfield,.....	156	242	655	29,190	19	13	3	1	36	13	4	195.74	5
Windham,.....	112	121	206	8,045	9	10	2	1	6	15	2	181.08	..
Litchfield,.....	169	240	339	12,198	18	4	3	..	9	38	4	178.11	..
Middlesex,.....	78	107	185	7,287	16	1	3	1	6	12	2	183.47	..
Tolland,.....	119	113	159	5,626	2	6	3	1	2	15	2	176.43	..
The State,	1127	1547	3628	151,012	135	57	60	15	170	162	35	188.82	21

SUMMARY BY COUNTIES

COUNTIES.	Schoolhouses.					Libraries.				
	Number.	Number Poor.	Built during year.	Cost of New.	Estimated value of sites and buildings.	No. Schools having.	No. of Books.	No. drawing State money.	Total amount drawn.	No. Public.
Hartford,.....	266	12	6	$165,100 00	$2,861,105 91	168	40,569	101	$1,840 00	26
New Haven, ...	272	23	3	5,425 00	3,170,461 36	130	45,187	47	1,445 00	17
New London,.....	216	23	2	30,575 61	871,055 00	73	13,221	32	515 00	15
Fairfield,.....	251	12	6	96,200 00	1,818,518 80	120	15,799	44	1,320 00	19
Windham,.....	132	7	1	725 00	274,506 00	72	9,544	29	280 00	16
Litchfield,.....	260	20	1	900 00	377,815 00	78	11,939	48	450 00	23
Middlesex, ...	105	4	..	.....	274,150 00	49	5,795	17	315 00	16
Tolland,.....	115	8	..	.....	232,310 00	53	4,444	16	140 00	12
The State,	1617	109	19	$298,925 61	$9,879,922 07	743	146,498	334	$6,305 00	144

TABLE SHOWING ENUMERATION OF PERSONS BETWEEN 4 AND 16 YEARS OF AGE, BY DISTRICTS, IN OCT., 1897.

HARTFORD COUNTY.

HARTFORD.

Districts.	*Enum. 1897.*
First,	2,470
South,	4,997
Second North	1,669
West Middle,	1,380
Arsenal,	1,278
Washington,	867
Southwest,	76
Northeast	660
Northwest	412
Total, 9 Districts,	13,809

AVON.

1,	8
2,	27
3,	28
4,	21
5,	39
6,	105
7,	18
Total, 7 Districts,	246

BERLIN.

1,	95
2,	114
3,	23
4,	30
5,	66
6,	37
7,	27
8,	72
9,	91
Total, 9 Districts,	555

BLOOMFIELD.

Centre,	67
Farms,	53
North Middle,	11
South Middle,	32
Scotland So. and No.	23
Duncaster,	25
Southwest,	25
Northeast,	18
Total, 8 Districts,	254

BRISTOL.

1,	523
2,	222
3,	669
5,	135
6,	66
8,	24
9,	30
10,	22
11,	38
12,	19
13,	171
Total, 11 Districts,	1,919

stricts.	*Enum. 1897.*

BURLINGTON.

First,	32
Second,	19
Third,	25
Fourth,	22
Fifth,	28
Sixth,	19
Seventh,	12
Eighth,	17
Ninth,	101
Total, 9 Districts,	275

CANTON.

Collinsville,	368
River,	97
Suffrage,	50
North Canton,	37
Center,	24
South Center,	33
East Hill,	20
West,	29
Total, 8 Districts,	658

EAST GRANBY.

1,	34
2,	20
3,	26
4,	10
5,	5
6,	19
Total, 6 Districts,	114

EAST HARTFORD.

1, North,	46
2, Second North,	312
3, Center,	348
4, Second South,	90
5, Hockanum,	78
6, South Middle,	37
7, Southeast,	25
8, Burnside,	323
9, Meadow,	199
10, Long Hill,	18
Total, 10 Districts,	1,476

EAST WINDSOR.

Consolidated,	732
Total, 1 District,	732

ENFIELD.

Consolidated,	1,558
Total, 1 District,	1,558

Districts.	*Enum. 1897.*

FARMINGTON.

Union,	403
Center,	158
East Farms,	51
West,	33
Scott's Swamp,	23
Waterville,	15
Northeast,	9
Total, 7 Districts,	692

GLASTONBURY.

1, Naubuc,	122
2, Center,	101
3, Green,	58
4, Old Church,	33
5, Addison,	43
6, S. Center,	72
7, Taylortown,	16
8, Matson Hill,	20
9, Twine Mill,	79
10, Nayaug,	33
11, North St.,	23
12, Wassuc,	45
13, Middle,	15
14, Hill,	8
15, Northeast,	23
16, Goslee,	10
17, Crosby's	45
18, Williams,	44
Total, 18 Districts,	790

GRANBY.

1,	43
2,	24
3,	10
4,	38
5,	12
6,	34
8,	20
9,	17
10,	26
11,	16
Total, 10 Districts,	240

HARTLAND.

Mill,	17
Southwest, W. Parish,	8
Center, W. Parish,	13
South Hollow,	8
North Hollow,	9
Southwest, E. Parish,	13
Center,	14
Northeast,	10
Total, 8 Districts,	92

HARTFORD COUNTY—*continued*

MANCHESTER.

Districts.	*Enum. 1897.*
1, Oakland,	44
2, Manchester Green,	90
3, Highland Park,	102
4, Bidwell,	94
5, Keeney Street,	84
6, Bunce,	65
7, Buckland,	117
8, Manchester,	444
9,	1,168
Total, 9 Districts,	2,208

MARLBOROUGH.

Middle,	31
Northwest,	26
North,	10
South,	10
Total, 4 Districts,	77

NEW BRITAIN.

Consolidated,	5,179
Total, 1 District,	5,179

NEWINGTON.

North,	63
Center,	50
South,	38
Southeast,	21
Total, 4 Districts,	172

PLAINVILLE.

Consolidated,	378
Total, 1 District,	378

ROCKY HILL.

Districts.	*Enum. 1897.*
North,	34
Center,	102
South,	55
West,	35
Total, 4 Districts,	226

SIMSBURY.

Consolidated.	400
Total, 1 District,	400

SOUTHINGTON.

Consolidated,	1,189
Total, 1 District,	1,189

SOUTH WINDSOR.

First,	37
Second,	22
Third,	48
Fourth,	
Fifth,	49
Sixth,	8
Seventh,	28
Eighth,	43
Ninth,	17
Tenth,	
Manchester Joint No. 1, Oakland	16
E. Windsor Joint No. 11,	10
E. Hfd. Joint, Long Hill,	9
Total, 10 Districts,	350

SUFFIELD.

1st Society.

Center,	149
South,	75
Southeast,	52

Districts.	*Enum. 1897.*
East,	41
Northeast,	55
North,	34
Northwest,	48

2d Society.

Center,	69
South,	26
North,	41
West,	28
Total, 11 Districts,	618

WEST HARTFORD.

Consolidated,	534
Total, 1 District,	534

WETHERSFIELD.

First or Broad St.,	74
Second or North Brick,	132
Third or High St.,	53
Fourth or West Hill,	60
Fifth or South Hill,	52
Sixth or Griswoldville,	41
Total, 6 Districts,	412

WINDSOR.

1,	67
2,	40
3,	218
4,	50
5,	35
6,	43
7,	27
8,	28
9,	129
10,	59
Total, 10 Districts,	696

WINDSOR LOCKS.

Consolidated,	749
Total, 1 District,	749

NEW HAVEN COUNTY.

NEW HAVEN.

City District,	21,648
Westville,	489
South,	69
Total, 3 Districts,	22,206

ANSONIA.

Consolidated,	2,801
Total, 1 District,	2,801

BEACON FALLS.

Consolidated,	81
Total, 1 District,	81

BETHANY.

1, Center,	43
2, Gate,	30
3, Smith,	14
4, Downs,	17
5, Beecher,	12
Total, 5 Districts,	116

BRANFORD.

Consolidated,	1,081
Total, 1 District,	1,081

CHESHIRE.

1,	61
2,	24
3,	31
4,	16
5,	12
6,	18
7,	34
8,	20
9,	17
10,	12
11,	22
12,	44
Total, 12 Districts,	311

DERBY.

Consolidated,	1,645
Total, 1 District,	1,645

EAST HAVEN.

Union,	190
North,	45
Total, 2 Districts,	235

GUILFORD.

1, Union,	368
2, Leete's Island,	69
3, Clapboard Hill,	12
5, Nut Plains,	18
6, Moose Hill,	10
7, Sachem's Head,	13
8, N. G., North,	14
9, N. G., Center,	26
10, N. G., South,	13
11, N. G., Bluff,	10
Joint with Madison,	10
Total, 10 Districts,	563

NEW HAVEN COUNTY — *continued*

HAMDEN.

Districts.	*Enum. 1897.*
Consolidated,	919
Total, 1 District,	919

MADISON.

Consolidated,	302
Total, 1 District,	302

MERIDEN.

Consolidated,	6,283
Total, 1 District,	6,283

MIDDLEBURY.

Center,	28
Breakneck,	29
Kissewaug,	27
Hopswamp,	45
Tylertown,	11
Sandy Hill,	7
Total, 6 Districts,	147

MILFORD.

Consolidated,	755
Total, 1 District,	755

NAUGATUCK.

1, Union Center,	1,448
2, Union City,	556
3, Millville,	59
4, Middle,	41
5, Pond Hill,	33
6, Straitsville,	13
Total, 6 Districts,	2,150

NORTH BRANFORD.

First,	24
Second,	57
Third,	23
Fourth,	5
Fifth,	15
Sixth,	40
Seventh,	21
Total, 7 Districts,	185

NORTH HAVEN.

Districts.	*Enum. 1897.*
1,	23
2,	46
3,	83
4,	96
5,	6
6,	19
7,	26
8,	60
Total, 8 Districts,	359

ORANGE.

Union,	1,007
Northern,	201
Western,	45
Tyler City,	38
First,	42
Second,	62
Third,	23
Fourth,	10
Total, 8 Districts,	1,428

OXFORD.

1, Center,	28
2, Quakers' Farms,	26
3, Chestnut Tree Hill,	25
4, Christian Street,	17
5, Five Mile Hill,	—
6, Riggs Street,	26
7, Bowers' Hill,	19
8, Hull's Hill,	22
10, Shrub Oak,	15
11, Red Oak,	13
12, Riverside,	12
13, Rock House Hill,	12
Total, 12 Districts,	215

PROSPECT.

Consolidated,	102
Total, 1 District,	102

SEYMOUR.

Consolidated,	752
Total, 1 District,	752

SOUTHBURY.

Districts.	*Enum. 1897.*
1, White Oak,	8
2, Bullet Hill,	41
3, Southford,	16
4, Kettletown,	30
5, South Britain,	29
6, Pierce Hollow,	26
7, Purchase,	45
8, Wapping,	20
9, Pootatuck,	11
Transylvania (J't Dis.)	8
Total, 9 Districts,	234

WALLINGFORD.

1, Cook Hill,	23
2, Parker's Farms,	36
3, Yalesville,	206
4, North Farms,	38
5, 6, Central,	1,525
7, Pond Hill,	39
8, East Farms,	26
9, N. E. Farms,	18
10, Tyler's Mills,	14
Joint District,	22
Total, 9 Districts,	1,947

WATERBURY.

Center,	10,017
Hopeville,	374
Waterville,	248
Town Plot,	121
Saw Mill Plains,	102
Bunker Hill,	114
Oronoke,	89
Buck's Hill,	64
South Brooklyn,	106
East Mountain,	31
East Farms,	45
Total, 11 Districts,	11,251

WOLCOTT.

Consolidated,	138
Total, 1 District,	138

WOODBRIDGE.

Consolidated,	199
Total, 1 District,	199

NEW LONDON COUNTY.

NEW LONDON.

Consolidated,	3,079
Total, 1 District,	3,079

NORWICH.

Central,	1,433
Town Street,	242
West Chelsea,	1,102
Falls,	274
Greeneville,	995
Wequonnock,	894
West Town Street,	118
Mill, or Yantic,	88
East Great Plain,	54
Scotland Road,	16
Plain Hill,	11
Wawecus Hill,	19
Total, 12 Districts,	5,246

BOZRAH.

First,	17
Second,	12
Third,	22
Fourth,	9
Fifth,	6
Sixth,	67
Seventh,	26
Total, 7 Districts,	159

COLCHESTER.

First,	205
Second,	30
Third,	36
Fourth,	21
Fifth,	49
Sixth,	18
Seventh,	26
Center,	15
Northeast,	25
Northwest,	14
Southeast,	11
Southwest,	16
Total, 12 Districts,	466

NEW LONDON COUNTY—*continued*

EAST LYME.

Districts.	*Enum. 1897.*
Consolidated,	335
Total, 1 District,	335

FRANKLIN.

Consolidated,	104
Total, 1 District,	104

GRISWOLD.

1,	10
2,	22
3,	10
4,	6
5,	15
6,	5
7,	36
8,	71
9,	13
10,	8
11,	6
12,	635
13,	12
14,	34
Total, 14 Districts,	883

GROTON.

1,	262
2,	42
3,	34
4,	36
5,	215
6,	57
7,	56
8,	38
9,	12
10,	101
11,	217
Ston'ton No. 6, (J. D.,)	20
Total, 11 Districts,	1,090

LEBANON.

1,	35
2,	18
3,	19
4,	10
5,	27
6,	51
7,	13
8,	9
9,	27
10,	20
11,	8
12,	12
13,	24
14,	16
15,	6
16,	15
Total, 16 Districts,	310

LEDYARD.

1, Long Cove,	9
2, Gales Ferry,	24
3, Draw Bridge,	29
4, Geer,	18
5, Meeting-house Hill,	25
6, Church Hill,	15
7, Cider Hill,	12
8, Gallup,	30
9, Unionville,	11
10, Lester	12
11, Lamb,	28
12, Gallup Hill,	14
13, Stoddard,	35
14, Lantern Hill,	11
Total, 14 Districts,	273

LISBON.

1, Newent,	21
2,	13
3,	39
4,	11
5,	29
6,	5
Total, 6 Districts,	118

LYME.

1, Bill Hill,	18
2, North Lyme,	18
3, Joshuatown,	21
4, North Grassy Hill,	15
5, South Grassy Hill,	11
6, Sterling City,	38
7, Hadlyme,	24
Total, 7 Districts,	145

MONTVILLE.

1, Center,	35
2, Manwarring,	11
3, West Side,	21
4, Palmertown,	222
5, Collins,	21
6, Houghton,	22
7, Barnes,	17
9, Massapeag,	16
10, Uncasville,	125
11, Chapel Hill,	31
12, Chesterfield,	30
13, Mohegan,	14
Total, 12 Districts,	565

NORTH STONINGTON.

1,	15
2,	50
3,	15
4,	49
5,	17
6,	18
7,	19
8,	6
9,	9
10,	16
11,	28
12,	1
13,	19
14,	24
15,	11
Total, 15 Districts,	297

OLD LYME.

Consolidated,	209
Total, 1 District,	209

PRESTON.

First,	198
Second,	217
Third,	11
Fourth,	86
Fifth,	23
Sixth,	34
Seventh,	19
Ninth,	14
Tenth,	18
Eleventh,	11
Twelfth,	38
Total, 11 Districts,	669

SALEM.

1,	13
Central,	29
4,	17
5,	10
6,	13
7,	18
8,	19
Total, 7 Districts,	119

SPRAGUE.

1, Baltic,	148
2, Potopogue,	9
3, Hanover,	33
4, Branch,	39
5, Versailles,	143
Total, 5 Districts,	372

STONINGTON.

1, Road,	23
2, Quiambog,	26
3, Mystic,	140
4, Mason's Island,	11
6, Old Mystic,	114
7, Wheeler,	18
9, Borough,	550
10, Wequetequock,	25
11, Pawcatuck,	49
13, Randall,	19
14, Tangwank,	6
15, Williams,	7
16, Liberty Street,	297
18, Palmer Street,	393
19, Harbor,	19
Total, 15 Districts,	1,697

VOLUNTOWN.

3,	14
4,	119
5,	11
6,	13
7,	8
8,	8
9,	8
10,	20
Total, 8 Districts,	201

WATERFORD.

1,	17
2,	40
3,	67
4,	67
5,	158
6,	136
7,	21
8,	25
9,	43
10,	73
11,	19
Joint District,	9
Total, 11 Districts,	675

FAIRFIELD COUNTY.

BRIDGEPORT.

Districts.	*Enum. 1897.*
Consolidated,	14,377
Total, 1 District,	14,377

BETHEL.

Consolidated,	812
Total, 1 District,	812

BROOKFIELD.

1,	46
2,	25
3,	31
4,	27
5,	19
6,	29
7,	17
8,	5
Total, 8 Districts,	199

DARIEN.

1, Noroton,	122
2, Center,	159
3, Ox Ridge,	48
4, Holmes,	66
Total, 4 Districts,	395

DANBURY.

Center,	3,260
South Center,	817
Deer Hill,	170
Beaver Brook,	118
Great Plain,	55
Miry Brook,	51
Middle River,	49
Mill Plain,	52
King Street,	33
Westville,	29
Pembroke,	32
Long Ridge,	26
Starr's Plain,	15
Total, 13 Districts,	4,707

EASTON.

Consolidated,	180
Total, 1 District,	180

FAIRFIELD.

Consolidated,	860
Total, 1 District,	860

GREENWICH.

1, Meeting House,	902
2, Cos Cob,	110
3, Sound Beach,	127
4, Mianus,	63
5, North Mianus,	100
6, North Cos Cob,	23
7, S. Stanwich,	30
8, N. Stanwich,	27
9, Banksville,	10
10, Round Hill,	47
11, Quaker Ridge,	28
12, North Street,	50
13, Clapboard Ridge,	31
14, Peck's Land,	37
15, Riversville,	50
16, Glenville,	130
17, King Street,	36
18, Byram,	243
19, E. Port Chester,	320
20, Pemberwick,	43
Total, 20 Districts,	2,407

HUNTINGTON.

Consolidated,	1,110
Total, 1 District,	1,110

MONROE.

Districts.	*Enum. 1897.*
Center,	43
Eastern,	24
Walker's Farms,	15
Cutler's Farms,	31
Stepney,	24
Elm Street,	24
Birdsey's Plains,	20
Total, 7 Districts,	181

NEW CANAAN.

Consolidated,	591
Total, 1 District,	591

NEW FAIRFIELD.

East Center,	32
West Center,	13
Pondville,	22
Centerville,	22
Great Meadow,	29
Wood Creek,	13
Total, 6 Districts,	131

NEWTOWN.

Flat Swamp,	10
Gray's Plain,	13
Gregory's Orchard,	15
Half Way River,	11
Hanover,	16
Head of the Meadow,	4
Hopewell,	11
Huntingtown,	35
Lake George,	12
Land's End,	27
Middle,	69
Middle Gate,	22
North Center,	51
Palestine,	36
Pohtatuck,	61
Sandy Hook,	135
South Center,	23
Taunton,	48
Toddy Hill,	25
Walnut-tree Hill,	35
Zoar,	34
Total, 21 Districts,	693

NORWALK.

1, South Norwalk,	1,513
2, Over River,	789
3, Center,	481
4, East Norwalk,	683
5, North West,	180
6, Broad River,	120
7, South 5-Mile River,	178
8, Middle 5-Mile River,	94
9, North Center,	222
10, West Norwalk,	91
11, Northeast,	76
Total, 11 Districts,	4,427

REDDING.

1, Center,	31
2, Redding Ridge,	32
3, Couch Hill,	22
4, Diamond Hill,	30
5, Boston,	53
6, Hull,	6
7, Umpawaug,	40
8, Lonetown,	19
9, Foundry,	10
10, Pickett's Ridge,	..
Total, 10 Districts,	243

RIDGEFIELD.

Districts.	*Enum. 1897.*
1, Scotland,	27
2, Bennett's Farm,	11
3, Limestone,	12
4, Titicus,	76
5, West Mountain,	27
6, Center,	122
7, West Lane,	56
8, Whipstick,	32
9, Flat Rock,	33
10, Branchville,	40
11, Florida,	24
12, Farmingville,	25
13, N. Ridgebury,	12
14, S. Ridgebury,	27
Total, 14 Districts,	524

SHERMAN.

1,	24
2,	25
3,	35
4,	10
5,	15
6,	7
Total, 6 Districts,	116

STAMFORD.

Consolidated,	4,371
Total, 1 District,	4,371

STRATFORD.

First,	597
Putney,	43
Oronoque,	21
Total, 3 Districts,	661

TRUMBULL.

Consolidated,	304
Total, 1 District,	304

WESTON.

Middle,	39
Good Hill,	39
Upper Parish,	26
Lyons Plains,	36
Forge,	16
Total, 5 Districts,	156

WESTPORT.

East Saugatuck,	130
West Saugatuck,	114
South Saugatuck,	115
Compo,	112
Green's Farms,	113
East Long Lots,	22
West Long Lots,	42
Cross Highway,	106
North,	18
Poplar Plain,	28
Total, 10 Districts,	800

WILTON.

1,	26
2,	32
3,	23
4,	22
5,	14
6,	61
7,	32
8,	8
9,	17
10,	124
Total, 10 Districts,	359

WINDHAM COUNTY.

ASHFORD.

Districts.	*Enum. 1897.*
1,	18
2	12
3,	7
4,	16
5,	9
6,	10
7,	17
8,	24
9,	6
10,	17
Total, 10 Districts,	136

BROOKLYN.

Consolidated,	495
Total, 1 District,	495

CANTERBURY.

1, Packerville,	10
2, Baldwin,	10
3, Willoughby,	12
4, Green,	17
5, Hyde,	14
6, North Society,	18
7, Frost,	17
8, Peck,	11
9, Smith,	11
10, Westminster,	23
11, Raymond,	11
Total, 11 Districts,	154

CHAPLIN.

Consolidated,	99
Total, 1 District,	99

EASTFORD.

1,	22
2,	31
3,	17
4,	3
5,	12
6,	26
7,	12
8,	10
Total, 8 Districts,	133

HAMPTON.

Center,	30
Union,	19
Apaquag,	21
No. Bigelow,	21
So. Bigelow,	22
South,	5
Goshen,	22
Total, 7 Districts,	140

KILLINGLY.

1, Danielson,	548
4, Center,	102
5, Mashentuck,	13
6, Dayville,	120
7, Williamsville,	154
8, Attawaugan,	177
9, Ballouville,	167
11, Tucker,	10
12, Chestnut Hill,	73
13, Valley,	37
14, Sparks,	11
15, Ledge,	11
16, S. Killingly,	28
17, Horse Hill,	10
18, Warren,	15
Total, 15 Districts,	1,476

PLAINFIELD.

Middle,	61
Stone Hill,	16
Flat Rock,	30
South,	3
White Hall,	6
Black Hill,	6
Union,	104
Moosup,	548
Pond Hill,	33
Green Hollow,	17
Wauregan,	364
Total, 11 Districts,	1,188

POMFRET.

1, Abington,	48
2, Elliotts,	24
3, Jericho,	12
4, Ragged Hill,	9
5, Pomfret Landing,	40
6, Pomfret Center,	80
7, Pomfret Street,	59
8, Chandler,	23
9, Fractional Districts,	19
Total, 8 Districts,	314

PUTNAM.

Consolidated,	1,521
Total, 1 District,	1,521

SCOTLAND.

Consolidated,	97
Total, 1 District,	97

STERLING.

1, Ekonk,	29
2, Bailey,	9
3, Sterling Hill,	21
4, Oneco,	72
5, Sterling,	92
7 and 8, Titus,	26
9, Granite,	29
Total, 8 Districts,	278

THOMPSON.

3,	32
4,	59
5,	20
6,	55
7,	283
8,	76
9,	11
10,	45
11,	41
12,	25
13,	18
15,	19
16,	695
Total, 13 Districts,	1,379

WINDHAM.

Consolidated,	1,996
Total, 1 District,	1,996

WOODSTOCK.

1,	26
2,	38
3,	16
4,	46
5,	36
6,	28
7,	21
8,	16
9,	31
10,	9
11,	15
12,	41
13,	6
14,	26
15,	16
16,	21
Total, 1 District,	392

LITCHFIELD COUNTY.

LITCHFIELD.

Consolidated	660
Total, 1 District,	660

BARKHAMSTED.

1, Center,	15
2, Center Hill,	15
3, Washington Hill,	18
4, Northeast,	16
5, Southeast,	16
6, South Hollow,	20
7, North Hollow,	10
9, Riverton,	46
10, Valley,	37
11, Mallory,	24
Total, 10 Districts,	217

BETHLEHEM.

1, Center,	42
2, Hard Hill,	3
3, North Carmel Hill,	6
4, Hayes,	15
5, South Carmel Hill,	20
6, Kasson,	19
7, Munger Lane,	9
Total, 7 Districts,	114

BRIDGEWATER.

1, Center,	60
2, Treat,	25
3, Mallet,	19
4, River,	22
5, Southville,	4
Total, 5 Districts,	130

CANAAN.

1, Beebe Hill,	43
2, Huntsville,	21
4, Canaan Mountain,	18
5, Under Mountain,	24
6, South Canaan,	11
7, Grassy Hill,	34
9, Barrack,	19
Total, 7 Districts,	170

LITCHFIELD COUNTY — *continued*

COLEBROOK.

Districts.	*Enum. 1897.*
River,	28
Forge,	30
Rock,	21
Southwest,	8
North,	9
West,	12
Center,	20
Beach Hill,	12
South,	36
Total, 9 Districts,	176

CORNWALL.

Consolidated,	248
Total, 1 District,	248

GOSHEN.

1, Goshen Center,	35
2, East Street,	18
4, South End,	3
6, West Side,	19
7, West Goshen,	29
8, North Goshen,	20
9, Hart Hollow,	3
10, Hall Meadow,	8
12, Newcomb,	14
Union,	7
Total, 10 Districts,	156

HARWINTON.

Consolidated,	310
Total, 1 District,	310

KENT.

1, Flanders,	45
2, Plains,	55
3, North Kent,	25
4, Macedonia,	22
5, Bull's Bridge,	21
6, South Kent,	20
7, Geer Mountain,	9
8, Rock,	6
9, East Kent,	19
10, Fuller Mountain,	11
12, Kent Hollow,	12
13, Ore Hill,	14
14, Skiff Mountain,	11
Total, 13 Districts,	270

MORRIS.

1,	23
2,	27
3,	23
4,	13
5,	9
6,	17
Total, 6 Districts,	112

NEW HARTFORD.

North End,	154
Greenwoods,	308
Pine Meadow,	112
West Hill,	15
Town Hill,	25
Bakerville,	27
Merrill,	16
South East Middle,	20
South East,	20
Fractional,	19
Total, 9 Districts,	716

NEW MILFORD.

Districts.	*Enum. 1897.*
Consolidated,	767
Total, 1 District,	767

NORFOLK.

Center,	134
West Norfolk,	61
North Middle,	13
East Middle,	24
North End,	8
North Norfolk,	16
Ponds,	4
South Middle,	29
South End,	11
Crissey,	13
South Norfolk,	18
Total, 11 Districts,	331

NORTH CANAAN.

1,	87
2,	199
3,	28
4,	26
5,	29
Total, 5 Districts,	369

PLYMOUTH.

1, Center,	131
2, Terryville,	208
3, East Plymouth,	37
4, North,	22
5, Baldwin,	26
6, Greystone,	40
7, Town Hill,	34
8, Allentown,	17
Total, 8 Districts,	515

ROXBURY.

1, Center,	32
2, Painter Hill,	16
3, Burritt,	9
4, Good Hill,	6
5, Warner's Mill,	24
7, North,	25
8, Weller,	68
Total, 7 Districts,	180

SALISBURY.

1, Ticknor,	7
2, Lakeville,	214
3, Town Hill,	26
4, Lime Rock,	83
5, Wetaug,	3
6, Whittlesey,	8
7, Center,	115
8, Ore Hill,	116
9, Harrison,	32
10, Chapinville,	41
11, Amesville,	64
12, Asylum,	21
13, Mt. Riga,	18
Total, 13 Districts,	748

SHARON.

Districts.	*Enum. 1897.*
1, Hartwell,	20
2, Consolidated,	127
3, Calkins,	23
4, Amenia Union,	45
5, Gay Street,	24
6, Sharon Mountain,	13
7, White's Hollow,	18
8, Pine Swamp,	11
9, Sharon Valley,	54
10, Handlin,	12
11, Mudgetown,	8
12, Ellsworth, Lower,	10
13, Ellsworth, Upper,	13
14, Ellsworth East St.,	7
15, Perry,	14
16, Hall,	7
17, West Woods,	6
Total, 17 Districts,	413

THOMASTON.

Consolidated,	650
Total, 1 District,	650

TORRINGTON.

Consolidated,	2,334
Total, 1 District,	2,334

WARREN.

North Street,	19
Northeast,	14
Center,	24
College Farms,	10
Pond,	10
West,	5
South River,	3
Fractional,	2
Total, 7 Districts,	87

WASHINGTON.

Consolidated,	382
Total, 1 District,	382

WATERTOWN.

Center,	303
Guernseytown,	20
French Mountain,	14
Linkfield,	17
Nova Scotia,	29
Polk,	27
East Side,	37
South,	87
Poverty Street,	25
Total, 9 Districts,	559

WINCHESTER.

1, Winsted,	525
3, Wallen's Hill,	23
4, West Winsted,	909
5, Sucker Brook,	27
6, Danbury Quarter,	22
7, Winchester,	32
8, Southeast,	13
9, Southwest,	25
Fractional,	3
Total, 8 Districts,	1,579

WOODBURY.

Consolidated,	388
Total, 1 District,	388

MIDDLESEX COUNTY.

MIDDLETOWN.

Districts.	*Enum. 1897.*
City,	1,862
Westfield, 1st,	51
Westfield, 2d,	30
Westfield, 3d,	16
Westfield, 4th,	18
Newfield,	53
North Staddle Hill,	40
South Staddle Hill,	82
West Long Hill,	42
East Long Hill,	61
Durant,	191
Farm Hill,	137
Miller's Farms,	339
Johnson Lane,	16
Hubbard,	35
Maromas,	45
Haddam Road,	8
Bow Lane,	29
Industrial,	111
Total, 19 Districts,	3,166

HADDAM.

1, Haddam Center,	108
2, Higganum,	185
3, Ponsett,	34
4, Shailerville,	20
6, Candlewood Hill,	32
7, Tylerville,	21
9, Brainard Hill,	27
12, Burr,	11
14, Haddam Neck,	36
Total, 9 Districts,	474

CHATHAM.

Center, East Hampton,	136
N. Center, "	59
Clark's Hill, "	30
North, "	9
East, "	26
Southeast, "	28
N. W., Middle Haddam,	51
Center, "	26
Gate, "	45
Chestnut Hill, "	28
Total, 10 Districts,	438

CHESTER.

Districts.	*Enum. 1897.*
Consolidated,	271
Total, 1 District,	271

CLINTON.

Consolidated,	259
Total, 1 District,	259

CROMWELL.

Consolidated,	502
Total, 1 District,	502

DURHAM.

Coginchaug,	68
Center,	27
South,	21
South West,	19
Middle West,	17
Total, 5 Districts,	152

EAST HADDAM.

1, Center,	34
2, Landing,	50
3, Red Lane,	23
4, North Moodus,	45
5, Bashan,	52
6, Mt. Parnassus,	10
7, Main Street,	35
8, Leesville,	10
9, Moodus,	89
10, Millington,	27
11, North Plain,	15
12, Olmstead,	4
13, Foxtown,	2
14, Tater Hill,	14
15, Millington West,	10
16, Ackley,	11
17, Hadlyme,	26
Total, 17 Districts,	457

ESSEX.

Districts.	*Enum. 1897.*
Consolidated,	364
Total, 1 District,	364

KILLINGWORTH.

Consolidated,	135
Total, 1 District,	135

MIDDLEFIELD.

1, North,	26
2, South,	76
3, Falls,	39
4, East,	35
Total, 4 Districts,	176

OLD SAYBROOK.

Consolidated,	288
Total, 1 District,	288

PORTLAND.

1,	157
2,	657
3,	37
4,	35
5,	16
6,	147
Total, 6 Districts,	1,049

SAYBROOK.

Consolidated,	308
Total, 1 District,	308

WESTBROOK.

Consolidated,	153
Total, 1 District,	153

TOLLAND COUNTY.

TOLLAND.

1,	37
2,	35
3,	18
4,	30
5,	24
8,	12
7 and 9,	24
10,	14
11,	7
12,	13
13,	9
Total, 12 Districts,	223

ANDOVER.

Consolidated,	55
Total, 1 District,	55

BOLTON.

Center,	12
North,	26
South,	22
Southwest,	22
Northwest,	2
Total, 5 Districts,	84

COLUMBIA.

Chestnut Hill,	19
North,	19
Hop River,	29
Pine Street,	13
West,	29
Hop River Village,	12
Southwest,	7
Center,	30
Total, 8 Districts,	158

COVENTRY.

1,	109
2,	23
3,	29
4,	20
5,	16
6,	34
7,	30
8,	26
9,	28
10,	13
Total, 10 Districts,	328

ELLINGTON.

1,	57
2,	30
3,	38
4,	8
5,	16
6,	53
7,	11
8,	21
9,	13
10,	113
Total, 10 Districts,	360

HEBRON.

First,	39
Second,	18
Third,	7
Fourth,	26
Fifth,	16
Sixth,	6
Eighth,	21
Ninth,	14
Tenth,	13
Eleventh,	16
Total, 10 Districts,	174

TOLLAND COUNTY — *continued*

MANSFIELD.

Districts.	*Enum. 1897.*
1, Center,	30
2, Hollow,	32
3, Spring Hill,	9
4, Storrs,	23
5, Four Corners,	25
6, Merrow,	23
7, Depot,	23
8, Eagleville,	54
10, City,	28
11, Chestnut Hill,	24
12, Atwoodville,	27
13, Mount Hope,	15
14, Gurleyville,	21
15, Wormwood Hill,	7
Formerly Bedlam,	10
Total, 14 Districts,	351

SOMERS.

1,	28
2,	11
3,	19
4,	17
5,	21
6,	153
7,	17
8,	4
9,	11
10,	5
Total, 10 Districts,	286

STAFFORD.

Districts.	*Enum. 1897.*
1,	124
2, Springs and Foxville,	534
4, Street,	15
5, Staffordville,	80
6, Washburn,	37
7, Works,	2
8, Rockwell Hill,	24
9, Hall,	15
10, Village,	7
12, Square Pond,	22
13, W. Stafford Center,	71
14, Crow Hill,	9
15, Lull,	10
16, Patten,	18
17, Kent Hollow,	14
Total, 15 Districts,	982

UNION.

1,	15
2,	20
3,	15
4,	21
5,	7
6,	18
Total, 6 Districts,	96

VERNON.

Districts.	*Enum. 1897.*
East,	835
West,	689
North East,	95
South East,	15
Center,	70
South,	53
South West,	35
Talcottville,	47
North West,	12
Total, 9 Districts,	1,851

WILLINGTON.

1, Center,	30
2, Daleville,	18
3, Hollow,	13
4, Moose Meadow,	8
5, Potter,	6
6, Roaring Brook,	22
7, Village Hill,	28
8, Glass Factory,	26
9, South Willington,	47
Total, 9 Districts,	198

AMOUNTS PAID BY STATE FOR LIBRARIES AND APPARATUS

Report of Year	Amount
1857,	$760.00
1858,	2,240.00
1859,	2,100.00
1860,	1,160.00
1861,	730.00
1862,	435.00
1863,	490.00
1864,	530.00
1865,	405.00
1866,	590.00
1867,	515.00
1868,	865.00
1869,	1,730.00
1870,	1,960.00
1871,	2,385.00
1872,	2,345.74
1873,	2,955.00
1874,	3,340.00
1875,	2,450.00
1876,	2,900.00
1877,	2,270.00
1878,	2,975.00
1879,	3,190.00
1880,	3,040.00
1881,	3,005.00
1882,	4,255.00
1883,	3,470.00
1884,	3,090.00
1885,	3,025.00
1886,	3,300.00
1887,	3,525.00
1888,	5,000.00
1889,	3,835.00
1890,	5,890.00
1891,	4,405.00
1892,	4,885.00
1893,	4,960.00
1894,	6,505.00
1895,	6,185.00
1896,	5,820.00
1897,	7,090.00
1898,	6,830.00
1899,	6,305.00
	$133,740.74

STATE TEACHERS' EXAMINATIONS

FOR

ELEMENTARY CERTIFICATES

First Day

A. M. —	9.00 to 9.30	SPELLING
	9.30 to 10.30	LITERATURE
	10.30 to 12.30	ARITHMETIC
P. M. —	1.30 to 2.30	WRITING
	2.30 to 3.30	READING
	3.30 to 6.00	ELEMENTARY SCIENCE AND GEOGRAPAY

Second Day

A. M. —	9.00 to 11.30	HISTORY AND CIVIL GOVERNMENT
	11.30 to 12.30	DRAWING (optional)
P. M. —	1.30 to 3.00	GRAMMAR
	3.00 to 4.40	PHYSIOLOGY
	4.30 to 5.30	VOCAL MUSIC (optional)

Preliminary papers should be written with ink and sent one week before the examination.

Examinations cannot be given in the different branches at any other hours than those mentioned above.

Examinations begin promptly at 9 o'clock.

GENERAL DIRECTIONS AND INFORMATION

1 Write the date and place of examination and your *number* on the outside of the envelope. Fill out the Information Blank and put it in the envelope.

2 Write the date and place of examination and *your number* and name of study at the top of each page of your work.

3 Write only on one side of the paper.

4 Number the answers to correspond with the questions.

5 Leave a margin at the left.

6 In Arithmetic write the operation as well as the answer. Answers alone will not be accepted.

7 The printed questions must be attached to papers containing answers.

8 The result of the examination will be communicated to you within one month.

9 Candidates for entrance to Normal School will be informed of their examinations within ten days.

10 Do not fold the papers.

11 Examinations will not be held at any other hours than those mentioned on the program.

ARITHMETIC

1 Write the process which you would employ in showing a class that the sum of 5 and 8 is 13, and that the product of 5 and 8 is 40.

2 What is meant by the sum of two numbers? Add the numbers 221, 153, and 939, and state how you would illustrate written addition to a class of scholars.

3 Multiply 240,000 by 2,400. Divide 1,728,000 by 12,000.

4 State how you would give to children a clear idea of "rod," "bushel," and "acre."

5 At what time would a telegram, sent from Chicago at 10.20 A.M., reach Berlin, if twenty minutes were occupied in transmission; longitude of Chicago 87° 35′ W., Berlin 13° 24′ E.?

6 A man working for $1.75 a day has his wages reduced 15%. Sixty working days afterwards his wages were raised 15%. How did his final wages compare with what he first had? What was the amount of loss during the sixty days?

7 What price must you pay for a 6% investment to yield 5%? Give operation.

8 At what rate, simple interest, will $134 amount to $139 in one year?

READING

1 What is reading?

2 What material would you use for a child's first reading lessons? Give reasons for your choice.

3 Name four books that you think children should read. State why you think they should be read, and the age of the children for which they are suitable.

4 Plan a lesson in reading. State clearly the age of the children for which the lesson is planned, the aim of the lesson, the material (including subject-matter) to be used, and the method of teaching.

GRAMMAR

I

1 How many cases are used in the English language? Why? Name the cases and give examples of a noun in each.

2 (*a*) Give three examples of nouns used only in singular.
(*b*) Give three examples of nouns used only in plural.
(*c*) Give three examples of plural forms of compound-nouns.
(*d*) Give the plural of the following:
Fish, shelf, colloquy, valley, child, index, shad.

3 Give uses, not less than three, of the passive voice, and illustrate by one example in each.

4 Give the use of each word in the following sentence :

"Where'er I roam, whatever realms I see,
My heart, untravelled, fondly turns to thee."

5 What is the place of the sentence in the study of Grammar? Illustrate.

6 Name the kind of ideas expressed by the words in the following sentence :

"A man's manners often influence his fortune."

7 What is the comparative importance of the "mother tongue" as an educational instrument?

8 State briefly and clearly how you would endeavor to teach children to speak and write correctly.

9 Write a letter applying for a school.

II

1 When should instruction in the use of capitals and punctuation be begun? Why?

2 To what extent will the English of the teacher help or hinder the language instruction of the scholars?

3 How would you try to help a scholar to a ready use of a larger vocabulary than he possessed when he came under your instruction.

4 What are the distinctions in the use of *would* and *should*.

5 Write an example of each of the following kinds of sentences: *Imperative*, *exclamatory*, *interrogative*, *declarative*.

6 Name the classes of words. On what is this division based.

7 Use the words *learn* and *teach* in sentences showing the contrast in their meaning.

8 Use the different forms of the verbs *make*, *sit*, *lay*, *ride*, and *write*, in sentences.

9 Write not less than ten lines on the subject "Examinations."

GEOGRAPHY

I

1 What and where is the Suez Canal? What are its commercial advantages?

2 What factors influence and determine climate?

3 Why is the climate of lands bordering on the sea less severe and more uniform than the climate of the interior continents in the same latitude?

4 What are astronomical zones? How determined? Isothermal zones? How determined?

5 Name the principal sources of the world's supply of cotton. What physical conditions are necessary to a profitable cultivation of the cotton plant?

6 Name four great commercial cities of our Atlantic coast, and give geographical reasons for there being centers of population at these points.

7 Locate Key West, Bay of Fundy, Winnipeg, Cape Hatteras, Buenos Ayres, Cape Horn, Naples, Amsterdam, Caucasus Mountains, Queenstown?

II

1 How would you convey to pupils correct ideas of latitude and longitude?

2 In what directions do the noon shadows fall in the South Temperate Zone?

3 What are trade winds? Why so called? How caused?

4 Why is the eastern part of Europe colder than the western part in the same latitude?

5 What political and commercial advantages would the possession of Cuba give the United States?

Answer the same question with regard to Hawaii.

6 Locate Galveston, Sitka, Gulf of Honduras, Venice, Sicily, Vienna, Tasmania, Tokio, Mt. Washington, Great Salt Lake.

HISTORY

1 Distinguish between "reading" and "study" of United States History.

2 Name five books which you consider adapted to arouse in young children an interest in United States History.

3 Should United States History appear in the first four years of a child's school life? Give reasons for your answer.

4 What relation is there between the teachings of Geography and History?

5 Give a brief account of the beginnings of Connecticut.

6 Contrast the modes of living in New England in colonial times and the present time.

7 Who were the Tories during the Revolution and what were their views? Write not less than ten lines on the reasonableness or unreasonableness of their actions.

8 Give an estimate of the character and public services of Daniel Webster, writing not more than one page and state your sources of information.

9 What histories have you read?

PHYSIOLOGY

I

1 What relation exists between the sciences of Chemistry and Physics and the science of Physiology?

2 How is the beating of the heart controlled?

3 Explain how oxygen finds its way into the blood.

4 What relation exists between muscular exercise and nutrition?

5 Why is it injurious to study when very tired?

6 Does the habitual use of alcohol affect all persons in the same way?

7 Compare alcohol, coffee, tea, and cocoa, as beverages.

II

1 What relation exists between the sciences of Chemistry and Physics and the science of Physiology?

2 How is the beating of the heart controlled?

3 Why do children remember what they write better than what they simply read?

4 Why is it injurious to study when very tired?

5 Explain how oxygen finds its way into the blood.

6 What effect has alcohol on the circulation of the blood?

7 What is the difference in effect between applying alcohol externally to the skin and taking it internally?

ELEMENTARY SCIENCE

(Write on one topic)

Chemistry —

1 Describe two methods of collecting hydrogen.

2 Give two illustrations of chemical union, and two of chemical decomposition.

3 What part does carbon dioxide play in animal life, vegetable life, and bread-making?

4 Write a lesson plan for teaching first lesson in Chemistry.

Physics —

1 Describe the method for grading a thermometer. What liquids are used in thermometers?

2 In what ways can the pitch of a musical instrument be varied? Upon what does the pitch depend?

3 Give the essentials of a mercurial barometer. What is meant by a "low pressure area"?

4 Mention three simple experiments which can be used to illustrate air pressure.

Geology —

1 What is meant by a flood plain?

2 What is the method for distinguishing quartz, feldspar, calcite?

3 Write a plan for teaching one lesson on sandstone.

4 What is the educational value in the study of mineralogy?

CIVIL GOVERNMENT

1 What is the purpose of government? Illustrate.

2 How is the town meeting a pure democracy? What is the advantage?

3 When does representative government become necessary? Give examples.

4 How do city taxes differ from town taxes?

5 Compare the parts and functions of city, state, and national government. Use schedule form if possible.

6 Why are courts necessary? Give examples of different courts.

STATE NORMAL SCHOOL

ENTRANCE EXAMINATION, 1898.

GEOGRAPHY

1 What are the tropics? Where are they? Why are they situated where they are?

2 What causes day and night?

3 What is the latitude of a place?

4 What is the season of each zone now?

5 Why is the torrid zone a hot belt?

6 How do you know the earth rotates?

7 Give the location of Manila and Santiago de Cuba.

8 What is the cargo of a ship loaded at each of the following places: Rio Janeiro, Calcutta, and Hong Kong?

9 Name and locate the most important European ports having commercial relations with the United States.

10 Where is each of the following: Odessa, Geneva, Brussels, Lyons, Glasgow?

HISTORY

1 How long did you study United States history in school? What text-book in United States history have you used?

2 Give briefly the methods of instruction employed by your teacher.

3 What books of biography or history have you read? Give titles.

4 What is meant by the resumption of specie payments?

5 State four important events in the history of Connecticut and tell why they are important.

6 What was the main issue in the presidential campaign of 1860? Who were the candidates?

What was the main issue of 1896? Who were the candidates?

7 What men are at the head of the National Government at the present time?

Who are the Senators in Congress from this state?

Who is the representative from your district?

8 Name the political divisions in which you live.

ARITHMETIC

1 A tailor can make 5 coats in 8 hours. Which will be the more profitable — to be paid 42c. a coat or 25c. an hour?

2 (*a*) Add 1/2, 2/5, 1.01, .001, and one and eight ten-thousandths.

(*b*) Multiply 3/5 by eight hundredths.

3 The Eiffel Tower at Paris is 300 meters high. How many feet high is it? (A meter is 3.37 inches more than a yard.)

4 How much can a bankrupt pay on a dollar if his liabilities are $8,000, and his assets $2,000?

5 A newsboy buys papers at $2.00 a hundred and sells them at 3c. apiece; what per cent. does he make?

6 There are 4,624 feet in a square lot; how many feet of fence will it take to go around the lot?

7 A merchant buys diaries at $5.00 a dozen with a discount of 40% and 20% off. If he sells his diaries at 25c. apiece, what per cent. does he gain?

8 John Morse, a storekeeper, has an account with James Brown, a customer. Brown has bought during the month of May, 1898, the foling articles:

May 2d, 3 pounds of butter @ 28c., 2 gallons kerosene @ 16c.
May 7th, 12 1/2 pounds sugar @ 12 1/2c., 1 bushel potatoes @ $1.10.
May 12th, 3 dozen eggs @ 24c., 2 pounds of tea @ 48c.
May 19th, 4 1/2 pounds codfish @ 6c., 1 box matches @ 8c.
May 27th, 1 barrel flour @ $7.15, 4 pounds crackers @ 6c.

June 1st John Morse sends a bill to Brown. Make out such a bill and receipt it.

GRAMMAR

1 State in order the schools you have attended, giving in each case the district and town. State the text-book in language or grammar with which you are most familiar.

2 State briefly the methods of instruction in grammar or language in these schools.

3 State briefly the benefits you received from the study of language or grammar. Give five illustrations with the particular statements in the grammar to which you trace the benefit.

4 Make a list, not to exceed five, of the books of English literature you have read, giving the titles.

5 Give an account of one of the books mentioned, making a brief outline of its contents.

6 (*a*) Lend me *that* book.
(*b*) *That* is my book.
(*c*) The book *that* you lent me is lost.
(*d*) You said *that* I had lost your book.

Explain the use of *that* in the foregoing sentences.

7 Write sentences into which you introduce the comparative of happy, idle, clean, saucy, big, gay, dry, ridiculous.

8 Which of the following adjectives, if properly employed, do not admit of comparison? general, annual, long, square, golden, Asiatic, void, everlasting, extravagant, indispensable.

9 Make short sentences using the following adjectives with the preposition which is used after each: fond, different, inconvenient, worthy, dependent, independent, angry.

REPORT ON HIGH SCHOOL COURSES

At its annual meeting in 1898, the Connecticut Association of Classical and High School Teachers appointed a committee to frame an adequate definition of a high school, and to prepare a course of study suitable for such schools. The committee consisted of fifteen, as follows:

Homer W. Brainard, Mathematics, Public High School, Hartford; Albert S. Cook, Professor of English, Yale College; Robert N. Corwin, Professor of German, Sheffield Scientific school; Edward G. Coy, Head Master, The Hotchkiss School, Lakeville; William B. Ferguson, Principal, High School, Middletown; Edwin H. Forbes, Superintendent and Principal, Torrington; Wilmot R. Jones, Head Master, High School, Stamford; Robert P. Keep, Principal, Free Academy, Norwich; Flavel S. Luther, Professor of Mathematics, Trinity College; Winfred R. Martin, Professor of Sanskrit, Trinity College; William G. Mixter, Professor of Chemistry, Sheffield Scientific School; Andrew W. Phillips, Professor of Mathematics, Yale College; William North Rice, Professor of Geology, Wesleyan University; Myron T. Scudder, Principal, Hillhouse High School, New Haven; Caleb T. Winchester, Professor of English, Wesleyan University.

At the meeting of the Association, February 25, 1899, the Committee presented the following report, which, after discussion, was unanimously adopted.

The Committee on the subject of High School Courses beg leave to submit the following report: —

The Association imposed upon us as a committee two distinct duties: (1) The consideration of the minimum standard which should entitle an institution to be recognized as a high school; (2) the formulation of a model course of study for high schools.

We believe the following will be recognized as a reasonable statement of the conditions which must be fulfilled by an institution in order that it may be recognized as worthy of the title of high school. It must provide a course of study covering at least three years after the completion of the eight or nine grades of primary and grammar school studies as commonly arranged in the schools of this State. It must furnish instruction in English continued through the three years, adapted to give the student the power of correct and vigorous expression, and to lead to a hearty appreciation of good literature. It must be able to furnish instruction in Latin, extending through the three years. It must teach History, particularly the history of the nations from which our own civilization and institutions are chiefly derived. In Mathematics, it must teach at least the elements of Algebra and Plane Geometry. Among the Physical and Natural Sciences, it must give instruction at least in Physics, Chemistry, and Physical Geography. The instruction in these subjects must not be confined to mere repetition of text-books, but must be attended with more or less of objective illustration. In Physics and Chemistry there must be at least lecture-table experiments, if it is impracticable to provide for laboratory work by the pupils themselves. It is eminently desirable that somewhat of laboratory work should be done by the pupils. In our opinion, an institution which does not fulfill these requirements, as regards extent of curriculum and mode of instruction, has no claim to be recognized as a high school.

While regarding three years as the minimum length of the high school curriculum, we believe it should be recognized that four years are necessary for the full accomplishment of the work which normally belongs to a high school. The high school should afford for those whose schooling will terminate within its walls instruction so varied and comprehensive in scope and so thorough and scholarly in spirit as to constitute what can fairly be called a liberal education. It should also serve as a link between the grammar school, and the college, the scientific school, or the professional school, for those who are able to pursue more or less extended courses of advanced study. If the resources of a school are insufficient for the complete fulfillment of both these ends, the former should have precedence. The high school exists chiefly for the large number of students for whom it is the last and highest school which they

can attend. It should, accordingly, provide liberally for extended courses of study in English Literature, History, and Physical and Natural Science. In addition to Latin (whose manifold relations to our language, literature, science, and institutions make it for the great majority of students the most important of foreign languages), the school should provide courses in German and French. If it is to serve also the function of a preparatory school for the higher institutions, it must extend its course in Latin to four years, and provide a three-year course in Greek, in order to meet the requirements of the colleges of this State and the majority of colleges in the northeastern United States. In Mathematics, it should provide for the study of Solid Geometry and Trigonometry, in order to meet the requirements of scientific schools and the scientific courses in some colleges.

In proposing for consideration a model high school course, according to what we conceive to be the spirit of our instructions, we are not disposed to claim that the program which we submit is one of ideal perfection, or that it would be the best thing practicable in every community. Our aim has been to construct a program which will enable a school satisfactorily to meet the requirements both of those students whose schooling is to end with that institution, and of those for whom the high school is to be a preparation for institutions of higher grade. We have endeavored further to arrange this program in a shape so simple that it can easily be adopted as a general model, from which variation can be made according to the conditions in particular communities, while yet the general plan is retained. In proposing thus a model, not to be followed everywhere without modification, but to be altered as may be necessary or expedient in adaptation to the special conditions of particular communities, it has seemed desirable to propose a single curriculum with a wide range of electives, rather than to propose a number of entirely distinct curricula. The conditions, however, under which our schools must work, necessitate a recognition of two somewhat distinct classes of students. The colleges of this State, and most colleges in this part of the country, require for admission to their classical courses so large an amount of Latin, Greek, and Mathematics that very little in other branches of study can be accomplished by students preparing for those classical courses. In our proposed curriculum we have recognized the division between

the classical students and the others, so far as seems necessary. It is proper to say that we propose this course as one adapted not to ideal but to actual conditions. Important changes in the high school course will be practicable, if certain studies, such as Latin, Algebra, and Geometry, which are now begun in the high school, shall be begun in the grammar school, or if the colleges shall so modify their requirements for admission to the classical course that the time of students in the classical course in the high schools shall not be occupied almost exclusively with linguistic and mathematical studies.

In order that the proposed curriculum may be practicable in schools of moderate size, we have provided for only one class in each subject. In very large schools, in which the number of teachers renders it possible, and the number of pupils renders it desirable, to organize two or more classes or sections in the same subject, it will be practicable and often advantageous to make the work of those classes or sections more or less different. For instance, it would be desirable for some of the students not preparing for college to commence French or German in the first year, while it would be desirable for students preparing for a college which requires French or German for admission to the classical course to begin the study of one of these languages in the third or fourth year of the high school course. A large school could thus very advantageously make the work in beginning French or German very different for these two classes, giving to the advanced students who had already studied two foreign languages longer lessons, and treating the subject otherwise in ways more or less different. But it is obviously only the largest schools that can make provision for two or more classes in the same subject. In our program we have, accordingly, provided for only one class in each subject; and we propose to meet the condition that it is advantageous for different students to commence the same study in different years of the course, by allowing a student to choose electives, not only from those assigned to his own year, but also from those assigned to any previous year of the course. The obvious objection that a student may be disposed to make his work easy by electing largely from studies assigned to earlier years in the course, is believed to be adequately met by regulations guarding the choice of electives, which will be stated in their proper place.

While the very largest schools can advantageously vary

the proposed program by providing two or more distinct classes in certain subjects, the smaller schools can adapt the program to their resources as regards staff and equipment by simply omitting such electives as they are unable to provide for. In our opinion, the studies, which in our program are required of all students, are studies which every institution claiming to be a high school ought to be able to teach. In regard to the elective studies we have not deemed it best to distinguish certain ones as more important than others. While not assenting to the proposition, in the full breadth in which it is often stated, that it makes little or no difference what a student studies so long as he studies in a sound method, we believe that that proposition is only an exaggeration of an important truth; and if, among smaller schools, one can provide instruction in Greek, another in French, and another in German,— if one can give a good course in Chemical Analysis, and another can provide a course in Zoölogy which shall include adequate laboratory work on the part of the students,—if one school can give a somewhat advanced course in critical study of English Literature, and another can provide advanced work in History and Civics,—we see no reason why each one of those schools may not be able to afford such a combination of studies as will furnish a sound education. The point to be insisted upon is that a small school should reduce the program to its capacity only by omitting certain electives, not by shortening the course or deteriorating the method of instruction in the studies which it professes to teach.

It is proposed that the students' selection of elective studies be limited by the following regulations:

1. Each student is expected to take not fewer than seventeen, nor more than twenty-three exercises per week. The larger number of exercises should, in general, be allowed only in the case of students of good health and more than average ability, or in cases where some considerable part of the work consists of electives of earlier years, which are likely to be easier than the studies of later years. Of the seventeen or eighteen exercises per week, which would be expected to constitute the work of most students, not more than fifteen, in general, should be exercises requiring the preparation of lessons on the part of the student. In the case of studies in which a considerable part of the work is laboratory work, two periods of actual laboratory work should be reckoned the equivalent of

one recitation requiring previous preparation. It is very desirable, if practicable, that the schedule of school hours should be so arranged that these two periods of laboratory work should be consecutive.

2. A student may elect studies assigned to an earlier year of the course than his own, but not (without special permission) those assigned to a later year.

3. Every student must take at least two years of one foreign language, unless excused for special reasons. No student may begin two languages the same year, nor may any one elect Greek unless he is taking or has already taken the second year in Latin. Each student must elect at least one course in History.

4. The choice of electives by every student must be subject to the approval of the teachers.

It is believed that by means of these regulations the students' selection of studies can be guided in such wise that the tendency to choose electives for the purpose of making the course too easy can be checked, and the curriculum of each student can be made to follow a rational and orderly sequence. It is needless to remark that the freedom of election will of necessity be somewhat limited by the schedule of school hours, and that that schedule can be so constructed as to facilitate intelligent and rational choices of electives, while rendering many merely whimsical combinations impossible.

While we have not deemed it best to provide for a so-called commercial course, in which a student is graduated in one, two, or three years, we have recognized that several of the studies usually included in such courses are thoroughly legitimate high school studies, since they may be pursued in such a way as to afford at once a vigorous mental discipline and valuable information. We have accordingly included several such studies in the list of electives in the later years of the course. We believe that such studies in the latter part of the high school course will be of great utility to many students, and that they will not tend (as they might if introduced earlier) to discourage the completion of a genuine high school course, or to transform the high school into a business college.

In addition to the studies of the four groups already specified, we have recognized the desirability of giving instruction in certain other branches, which seem to us not to be strictly co-ordinate with the regular studies of the course, but rather to

belong to a group by themselves. Such studies we have called optional studies. These studies, accordingly, are not to count in the quota of work required for graduation; but students who have a taste for them, or who are likely to make good use of them, should be encouraged to pursue them. In this group we have included Manual Training, Drawing, Vocal Music, and (after the first two years) Elocution. While we have not deemed it best, in the present transitional condition of instruction in Manual Training, to include it among the elective studies, we are of opinion that, in some schools where courses of that nature have been especially well organized, they may reasonably be allowed to count as electives.

It will be observed that, with few exceptions, the exercises in each study, both required and elective, are made to occur five times a week, either for a whole year or for half a year. In the judgment of the majority of the committee, whatever may be true of college students, students of high school grade do the best work when they pursue not more than three or four studies at a time, and when they have daily, or at least very frequent, exercises in those studies.

Tabular Statement of Course of Study

The letter R (Required) denotes the studies which are required of all candidates for graduation. The letters RG (Required of General Students) denote the studies which, in addition to the former group, are required of all except those who are preparing for the classical course in college. The letters RC (Required of Classical Students) denote the studies which, in addition to the group marked R, are required of those who are preparing for the classical course in college. It will be observed that the studies marked RG are elective for Classical students, and those marked RC are elective for General students. The letter E denotes those studies which are elective, and the letter O those studies which are optional, for all students.

The figure 1, 2, 3, or 4 *before* the name of the study indicates the first, second, third, or fourth year of that study, in advancing grades as shown in the notes upon studies which are appended. The figure *after* the name of the study indicates the number of exercises per week in that study. If not otherwise stated, a study continues through the school year.*

* In schools where it is not considered objectionable to have studies with recitations comparatively infrequent, some of the studies here placed five times a week for a half-year may be placed two or three times a week for the whole year. In that way somewhat more freedom of election can be secured.

I YEAR

R.	1	English	3
		Elementary Algebra	4
		Physical Geography	5 (1st half).
R. C.	1	Latin	5
		History of Greece and Rome	5 (2d half).
E.	1	French	5
	1	German	5
		Botany	5 (2d half).
		General History	5
O.		Drawing	
		Music	
		Manual Training	

II YEAR

R.	2	English	3
		Geometry	4
R. G.		Elementary Physics	5 (2d half).
R. C.	2	Latin	5
	1	Greek	5
E.	2	French	5
	2	German	5
		History of England	5 (1st half).
O.		Drawing	
		Music	
		Manual Training	

III YEAR

R.	3	English	3
R. G.		Elementary Chemistry	5 (1st half).
R. C.*	3	Latin	5
	2	Greek	4
		Algebra and Geometry†	4 (1st half).
E.	1	English Literature	5 (2d half).
	3	French	5
	3	German	5
		Solid Geometry	4 (2d half).
		Advanced Physics	5 (2d half).
		Zoology	5 (2d half).
		Constitutional History of United States and England, and Civics	5
		Medieval History	5 (1st half).
		Commercial Geography	5 (2d half).
		Commercial Arithmetic and Bookkeeping	5

* In schools of the largest size, a course beginning French or German can be advantageously introduced in the second half-year, required for Classical students. The Classical students in their third year could accomplish in a half-year about as much as the General students in the whole of the first year.

† This course may be postponed to the 4th year, when that arrangement is considered desirable.

O.		Drawing	
		Music	
		Manual Training	
		Elocution	

IV YEAR

R.	4	English	3
R. C.	4	Latin	5
	3	Greek	5 (1st half), 3 (2d h.)
		Advanced Algebra	4 (2d half).
E.		Trigonometry	5 (1st half).
		Advanced Chemistry	5
		Geology	5 (1st half).
		Astronomy	5 (2d half).
		Physiology	5 (2d half).
		Meteorology	5 (1st half).
	2	English Literature	5 (1st half).
		Modern History*	5
		Economics	5 (2d half).
		Commercial Law	5 (1st half).
O.		Drawing	
		Music	
		Manual Training	
		Elocution	

While the explanations already given should be sufficient to render the foregoing tabular statement of the course of study intelligible, it may be helpful to suggest some combinations of required and elective studies which would meet the wants of certain types of students. We give accordingly six such programs, of which Nos. 1–4 are such as may be arranged for students whose schooling is to terminate in the high school, while Nos. 5 and 6 are adapted for students preparing for higher institutions. No. 1 is a general or eclectic course, including some scientific and some literary studies, without any decided tendency to specialization in any direction. No. 2 is a course of a distinctly literary character. No. 3 is a course arranged to give as much of science as possible. No. 4 is a course such as may be selected with the aim of preparation definitely for commercial pursuits. No. 5 is a course which will meet the requirements for admission to most of the colleges. No. 6 will meet the requirements for admission to most of the scientific schools.

In the following schedules, a number before the name of a study indicates (as in the previous table) the first, second, third,

*The course in Modern History may be elected for the whole year, or for either half.

or fourth year of that study. A number after the name of a study indicates the number of exercises per week. If the study continues only through a half-year, the fact is indicated by 1 or 2, as the case may be, printed like an exponent above the figure denoting the number of exercises per week.

No. 1

I. 1 English 3, Elementary Algebra 4, Physical Geography 5^1, Botany 5^2, 1 German 5.

II. 2 English 3, Geometry 4, Elementary Physics, 5^2, History of England 5^1, 2 German 5.

III. 3 English 3, Elementary Chemistry 5^1, 3 German 5 or Constitutional History and Civics 5, 1 French 5, Zoology 5^2 or English Literature 5^2.

IV. 4 English 3, 2 French 5, Modern History 5, Geology 5^1, Physiology 5^2 or English Literature 5^2.

No. 2

I. 1 English 3, Elementary Algebra 4, Physical Geography 5^1, 1 Latin 5, History of Greece and Rome 5^2.

II. 2 English 3, Geometry 4, Elementary Physics 5^2, History of England 5^1, 2 Latin 5.

III. 3 English 3, Elementary Chemistry 5^1, 3 Latin 5, 1 German 5, 1 English Literature 5^2.

IV. 4 English 3, 4 Latin 5, 2 German 5, 2 English Literature 5^1, Modern History 5^2.

No. 3

I. 1 English 3, Elementary Algebra 4, Physical Geography 5^1, Botany 5^2, 1 German 5.

II. 2 English 3, Geometry 4, Elementary Physics 5^2, History of England 5^1, 2 German 5.

III. 3 English 3, Elementary Chemistry 5^1, Algebra and Geometry 4^1, 3 German 5, Advanced Physics 5^2, Zoology 5^2.

IV. 4 English 3, Advanced Chemistry 5, Geology 5^1, Astronomy 5^2, Physiology 5^2, Meteorology 5^1.

No. 4

I. 1 English 3, Elementary Algebra 4, Physical Geography 5^1, Botany 5^2, General History 5.

II. 2 English 3, Geometry 4, Elementary Physics 5^2, History of England 5^1, 1 French 5.

III. 3 English 3, Elementary Chemistry 5^1, 2 French 5, Commercial Geography 5^2, Commercial Arithmetic and Book-keeping 5.

IV. 4 English 3, Geology 5^1, Physiology 5^2, Constitutional History and Civics 5, Commercial Law 5^1, Economics 5^2.

No. 5

I. 1 English 3, Elementary Algebra 4, Physical Geography 5^1, 1 Latin 5, History of Greece and Rome 5^2.

II. 2 English 3, Geometry 4, 2 Latin 5, 1 Greek 5.
III. 3 English 3, 3 Latin 5, 2 Greek 4, Algebra and Geometry, 4, 1 French 5 or 1 German 5*.
IV. 4 English 3, 4 Latin 5, 3 Greek 5^1, 3^2, Advanced Algebra 4^2, 2 French 5 or 2 German 5*.

No. 6

I. 1 English 3, Elementary Algebra 4, Physical Geography, 5^1, 1 Latin 5, Botany 5^2.
II. 2 English 3, Geometry 4, Elementary Physics 5^2, History of England 5^1, 2 Latin 5.
III. 3 English 3, Elementary Chemistry 5^1, 3 Latin 5, Algebra and Geometry 4^1, Solid Geometry 4^2, 1 French 5 or 1 German 5.
IV. 4 English 3, Advanced Algebra 4^2, Trigonometry 5^1, Constitutional History and Civics 5, 2 French 5 or 2 German 5.

We desire to emphasize the statement that the above schedules are presented merely as specimens of the very numerous combinations which may be made, and are not recommended as better than any others. They illustrate the truth that from the list of electives (in connection with the required studies) a selection may be made which will satisfy almost any reasonble preference, and which will be adapted to almost any plans of future study or work.

It will be observed that, under the specification of required studies and the rules governing the choice of electives, a candidate for graduation must in general have four years of English, at least two years of at least one foreign language, at least one course in History, Elementary Algebra, and Plane Geometry, and at least one of the group of Physical and Natural Sciences. All the great lines of study which afford the most effective mental discipline, and guide to a sound knowledge of man's relation to his fellows and to the universe in which he lives, must be represented.

ANCIENT AND MODERN LANGUAGES

Grammar is the science of language and the art of applying it; consequently, a systematic and progressive study of grammar throughout the entire course is earnestly recommended. The pupil should be taught that the grammar is the medium

* Students preparing for a college which does not require a modern language)or which requires a smaller amount in that subject), can elect in the 3d and 4th years Physics and Chemistry, or other subjects, scientific or literary. Girls preparing for the literary courses in the women's colleges would take three years of French ro German instead of Greek.

through which a scientific knowledge of a language is obtained. The paradigms, the rules of syntax, the principles governing the subjunctive mood, word-formation, and prosody, must be carefully studied and committed to memory. The analysis of forms of nouns and verbs, especially in Latin and Greek, is strongly urged, in order that the pupil may comprehend the unity that exists amid what is apt to be considered a labyrinth of irregularities. Analysis alone gives the pupil a complete mastery of verbal forms, and leads to the science of Comparative Philology; analysis makes the comparison of words of different languages intelligent, and shows the changes through which words have passed from early times until now. There should be a constant correlation of principles, until grammatical facts cease to be merely isolated truths, and something of the beauty of the science of language is seen and appreciated. A comparison of grammars of different languages should receive constant attention, especially when two or more languages are studied by one pupil. To give completeness and vividness, there should be a review of the grammar during the latter part of the course, in which general principles should be emphasized.

Prose composition affords the best means of fixing in mind the various forms of the paradigms, of increasing the vocabulary, and of gaining an insight into the principles of syntax; hence its importance in language study. Besides frequent exercises in composition based on a prescribed portion of text, there should be a more formal study in which the principles of the language are systematically and logically treated. Reading of the text aloud with expression and interpretation of the thought is strongly urged; this is especially important in poetry. Much can be gained by the teacher or pupil reading the text to listening pupils, until the reading becomes intelligent and the pupils enter into the spirit of the language and its peculiar word arrangement.

Reading at sight of unprepared passages gives confidence, and is an aid to rapid and exact interpretation of the text; it also affords the teacher the opportunity of showing the pupils how to attack the involved constructions of a complicated sentence.

In all exercises in translation, emphasis should be laid upon the requirement of correct and idiomatic English.

Due attention should be given to geographical, historical, mythological, and other allusions in the selections read.

Four-Year Latin Course

First Year.

Thorough drill in Grammar.
Easy Latin lessons.
Much practice in writing easy Latin sentences.
Much practice in reading Latin aloud.

Second Year.

Cæsar, 4 books (equivalents for 2 books); Sallust, selections from the Catiline.
Prose Composition based on Cæsar.
Reading Latin aloud.
Memorizing selected passages.
Reading at sight. Systematic study of the Grammar.

Third Year.

Cicero, 7 orations.
Ovid begun.
Prose Composition based on Cicero.
Reading Latin aloud.
Memorizing selected passages.
Reading at sight.

Fourth Year.

Vergil, 8 books (equivalents for 2 books).
Ovid, continued through 1000 lines, with sight reading.
Careful practice in scanning aloud.
Memorizing selected passages.
Prose Composition.
Reading at sight.

Three-Year Greek Course

First Year.

Thorough drill in Grammar; analysis of forms.
Translation of simple sentences.
Anabasis, easy selections equivalent in amount to three chapters.
Prose Composition, using the vocabulary of the Anabasis; careful attention to accent.
Constant practice in reading Greek aloud.

Second Year.

Anabasis continued, 4 books (equivalents for 2 books).
Prose Composition based on Anabasis; careful attention to accent.
Reading Greek aloud.
Memorizing selected passages, and reproducing them in Greek.
Sight reading from the Anabasis, and other Attic Greek.
Systematic study of the Grammar.

Third Year.

Homer, Iliad, careful study of 3 books, or more rapid reading of 6 books (equivalents from Odyssey); study of Homeric forms.

Careful practice in scanning aloud.

Sight work in Attic prose.

Prose Composition based on Attic Greek.

THREE-YEAR GERMAN COURSE

First Year.

Careful practice in pronouncing German accurately and fluently, and in understanding simple phrases and sentences.

Declension of articles, adjectives, pronouns, and easily classified nouns; conjugation of weak and of the more usual strong verbs; simpler uses of modal auxiliaries, reflexive pronouns; separable and inseparable prefixes; the more usual prepositions, conjunctions, and adverbs; the elementary rules of word-order and syntax. Systematic grammar lessons should be illustrated and enforced by thorough drill upon the text read, and by *exercises*, both written and oral, based upon the reading of the day or other familiar subjects.

Reading: as much sight reading as possible. Continued reading aloud by both teacher and pupil. An easy reader, or easy stories from Grimm, Andersen, Hauff, Volkmann, Storm, Baumbach, Heyse.*

Simple poems from Goethe, Heine, Uhland, Arndt, memorized.

Second Year.

A more formal study of accidence, of the syntax of the cases and moods, especially the subjunctive and infinitive moods, and the modal auxiliaries. The principal parts of strong verbs, word-order, word-formation and derivation; attributive phrases.

Composition: conversation, and themes based on the reading and grammar lessons. Translation into English of connected prose.

Reading suggested: Heyse, Storm, Hillern, Gerstöcker, Chamisso, Hoffmann, Riehl, Zschokke. Poems from Goethe and Schiller.

Third Year.

A sufficient amount of reading to overcome all difficulties of vocabulary and style. Works suggested: Ballads and Lyrics of Goethe and Schiller, Dichtung and Wahrheit, Götz von Berlichingen, Wilhelm Tell, Minna von Barnhelm, Maria Stuart, Hermann und Dorothea, Die Journalisten, Bilder aus der Deutschen Vergangenheit, Die Harzreise.

Outlines of German Literature; the Classical Period in German Literature; history of the German language; relation of German to English.

Composition: letters, themes, translation of connected prose, criticism of English translations from the German.

* It is difficult to say how much should be read. If the class have previously had a foreign language, much more may be read than by a class for whom German is the first foreign language studied. It is not intended that all the books mentioned be read by every class.

THREE-YEAR FRENCH COURSE

First Year.

Careful practice in pronouncing French accurately and fluently, and in understanding simple phrases and sentences.

Grammar: all uses and forms of nouns, pronouns, adjectives, and adverbs, common prepositions and conjunctions; conjugation of regular and common irregular verbs, of reflexive and impersonal verbs; the simpler idioms; general rules of syntax.

Composition: simple exercises in reproduction, writing from dictation, translating simple sentences into French.

Reading: Guerber's Contes et Legendes, Derrière les Haies, L'Abbé Constantin, Contes Choisis, La Perle Noire, or equivalents. Reading aloud, sight reading, poems memorized.

Second Year.

Grammar: more formal study of the uses of moods and tenses; idiomatic phrases.

Reading: Colomba, Le Roi des Montagnes, Le Pêcheur d'Islande, La Fée, Les Fourberies de Scapin, Mademoiselle de la Seiglière, or equivalents. Poems memorized.

Conversation: questions upon readings, oral reproductions of stories; talks upon subjects of interest.

Composition: simple original composition; letter writing; translation into French of connected passages in English.

Third Year.

Reading: Le Cid, Athalie, La Fontaine's Fables, Daudet's Contes, Le Misanthrope, Corinne, Hernani, or others.

Conversation and composition, essays.

Brief study of French literature.

ENGLISH LANGUAGE AND LITERATURE

The principal objects of a high school course in English are, to stimulate an intelligent interest in the best literature, and to cultivate the power of clear and accurate expression, both oral and written. Accordingly, the work of the course naturally falls in two closely related divisions: (1) Study of Masterpieces. (2) Composition and Rhetoric. The essentials of grammar should by no means be neglected. Teachers should be well acquainted with a considerable number of the best grammars, and manuals of composition, rhetoric, and English and American literature. A considerable degree of familiarity with English history is also necessary.

In the study of literary masterpieces the teacher should insist upon an attentive and thoughtful habit of reading, and should teach the pupil to combine, as far as possible, an in-

telligent appreciation of the book as a whole with a careful study of details. This more detailed and intensive study of the text may profitably be increased in the later years of the course, but in most cases it would probably be wise to select, for every year, a few books or a larger number of passages from several books for more minute study than can be given to the other required reading.

Much attention should be given to reading aloud with appreciative expression of the thought and feeling of the author. Passages selected for their force or beauty should be memorized and recited before the class or section. The leading principles of rhetoric may well be illustrated from the books read. Indeed, there should be constant correlation and interfusion of literary study with all the other branches of the work in English.

Recent editions of the masterpieces, specially prepared for school use, will be found to contain useful suggestions.

Four-Year Course in English

First Year.

Composition: Drill in clear, grammatical expression, with special attention to formation of sentences. The books read will furnish a great number of subjects for oral and written work. Subjects outside the books read should also be used, and these should be of a simple nature, within the circle of ideas common to boys and girls, and not requiring the use of encyclopedias or books beyond their years. Simple rules of punctuation, the simple parts of rhetoric, the common figures of speech. A portion of each recitation should be given to writing, and a limited number of narratives or descriptions may be required to be written outside the class-room.

The following books are suggested for class study :

The Lady of the Lake, ...	Scott.
The Talisman, ...	Scott.
Birds and Bees, ...	Burroughs.
Gettysburg Speech, ...	Lincoln.

For home study :

Tales of a Traveler, ...	Irving.
Succession of Forest Trees, ...	Thoreau.

Second Year.

Composition and Rhetoric. The work of the first year continued, with special attention to paragraph structure. Exercises in the simpler forms of exposition ; expression and defense of individual

opinions. Short themes in each recitation, and a number of longer exercises to be written outside the class-room. Further study of rhetoric. The elements of versification.

Reading of masterpieces as in the first year. The following are suggested for class study:

Julius Caesar,	Shakespeare.
Ivanhoe,	Scott.
Silas Marner,	George Eliot.
The Vision of Sir Launfal,	Lowell.
The Golden Treasury (selections),	Palgrave.

For home study:

Selections from	Ruskin.
Midsummer Night's Dream,	Shakespeare.

Third Year.

Composition and Rhetoric. More extended exposition and argument on familiar subjects. General review of rhetorical principles. Simple exercises in criticism, to lead the pupil to recognize the essential qualities of style. Frequent short themes and three or four longer essays.

The following books are suggested for class study:

Merchant of Venice,	Shakespeare.
L'Allegro, Il Penseroso, Comus, Lycidas,	Milton.
Sir Roger de Coverley Papers,	Addison.
Essays on Milton and Addison,	Macaulay.
The Princess,	Tennyson.

For home study:

Vicar of Wakefield,	Goldsmith.
The Last of the Mohicans,	Cooper.

Fourth Year.

Composition and Rhetoric. Practice continued, with special reference to ease and grace of expression. Frequent short themes, and three essays or orations of greater length.

Study of masterpieces as in previous years. During the year care should be taken to acquaint the pupil with the leading facts in the literary history of those periods to which the prescribed works belong.

For class study:*

Macbeth,	Shakespeare.
Paradise Lost, I, II,	Milton.
Speech on Conciliation,	Burke.

* The books read in the third and fourth years vary from year to year according to college requirements. The books assigned to the first and second years may be considered as suggestive rather than as rigidly prescribed. Many teachers will doubtless substitute equivalents for some or all of these, but the list may indicate the kind and amount of reading recommended for these years.

Essay on Burns, ... Carlyle.
Iliad, Books I, VI, XXII, XXIV, . . . Pope.

For home study :

Odyssey, ... Palmer.
Bunker Hill Oration, ... Webster.

Electives

Electives in English may be offered in the third and fourth years. Among the possibilities for such courses may be suggested :

1. The study of a selected author. For example, reading of selections from Chaucer, with some attention to the laws of sound-change, and the life and customs of the time, is suggested.

2. The study of some important period of literary history in a few of its most representative writings.

3. The outline study of English Literature from earliest times to the present, based upon a text-book, with critical readings of the most important authors mentioned.

4. History of the English language, including grammar, word-formation and word-derivation, sound-changes, and comparison of related languages already known to the pupils.

5. Elements of Old English. Reading of simple prose texts, with some attention to the laws of sound-change. Life and customs of the time.

ELOCUTION

The work in Elocution may be made optional with good effect, as, with the elaborated course in literature now laid out, it becomes simply training in voice-building, gesture, and expression as an art. Thorough instruction and ample practice should be furnished during the last two years of the course.

HISTORY

The elective in General History offered in the first year may best be given by means of a suitable text-book. It may serve to give an outline view of the world's progress for those who will take no other courses in History, or it may furnish an introduction to the more special courses in later years. It should not, however, be required as a condition of admission to the other courses.

In Greek and Roman History, recitations from a suitable text-book should form the basis of the work. The emphasis should be on the geography, language, government, architecture, literature, character, and permanent achievement of each people, rather than upon battles and wars. The text may be supplemented by maps, collateral reading in Grote, Mommsen, or other standard works, pictures of Greek and Roman sculpture, buildings, aqueducts, roads, etc.; translations of Herodotus, Thucydides, and Plutarch may be utilized to some extent. The modern biographies of Alexander, Hannibal, Cæsar, and Cicero may be drawn upon. The relation of mythology and religion to history should be noticed. Greek History should close with the death of Alexander, and Roman History with the first century A.D.

In English History the same points should be emphasized, and the same methods followed as in Greek and Roman History.

In the Constitutional History of the third year so much time should be given to a study of the English Constitution and the story of the struggle for liberty in England as will make clear what the mother country has contributed to the American charters and constitutions. A careful study may then be made of the Constitution of the United States and the important chapters in the development of its interpretation. The close of the period of Reconstruction is a fitting stopping-place. The discussion of the rights and duties of the citizen in nation, state, and city or town, may profitably close this year's work. Constant reference to secondary, and, if possible, to primary, sources should be made. In Connecticut a fitting succession for study would be these:

> The Laws of Alfred, William the Conqueror, and Henry II. Magna Charta, Simon de Montfort and the Parliament, Habeas Corpus and the Bill of Rights, Cromwell's Instrument of Government
>
> On this side: the Connecticut Government of 1639, the Winthrop Charter of 1662, the State Constitution of 1818 and its subsequent amendments; the United Colonies of 1643, and the other efforts toward union; the Declaration of Independence; the Articles of Confederation; the Constitution of 1789, and its amendments.

The course in Medieval History is perhaps the least important of all the historical courses; and, if any must be omitted, it may well be this one. The course may begin at the close of

first century A. D., and the causes of the decline and fall of the Roman Empire may be briefly dwelt upon; the conditions of the frontiers, the invasions of the barbarians and their settlements, until their floating masses crystallized into the principal nations; the empire of Charlemagne and its results; the development of Germany, France, Italy, and Spain (Medieval England will have been already studied); the spread of Christianity, the rise of the Papacy, and the growth of Islam; state of society, trade, education, letters; architecture; the forerunners of the Reformation; the Crusades, and their effects; and the voyages of discovery. The voyages of Columbus form the fitting close for a general survey of the whole period. Little more should be attempted.

In the fourth year an intensive study of particular periods or topics in Modern History may be taken. English, French, and American History supplies the most suitable material, and the subjects chosen should be treated as minutely as the resources at hand will permit. The subjects of the two half-years should be made so far distinct that each may be elected independently. In schools having large libraries accessible, this mode of study can be made very useful.

In all historical courses a library is of prime importance; a few well-selected books should in all cases be at hand. In no case should a class be confined to a single text-book. If the school has no library, the city or town library, now fortunately within reach everywhere, may be used. For further suggestions regarding the study of History in high schools the reader is referred to the text-books and manuals of history published during the past few years, which contain much valuable matter for teachers.

MATHEMATICS

The usual amount of Algebra, to the beginning of Quadratic Equations, in the better text-books, is required. The necessity of accuracy in arithmetical work and in the fundamental operations of Algebra should be urgently insisted upon. Special attention should be given to the interpretation of negative results, the theory of exponents, and radical quantities. The pupil's knowledge of Arithmetic should be the starting point from which his ideas may be extended to the more general ideas of Algebra; and care should be taken to present Algebra, not as a collection of disconnected rules or devices, but as a logical and

consistent system. In this direction it is not too much to teach and require the proofs of the easier rules. Several excellent text-books have appeared within a year or two, which supply most that can be desired in this direction. If the class have had the preparation in Algebra hereafter indicated as desirable before entering the high school, the proofs may be introduced after the first two or three months; if not, they should be postponed until the end of the year, or until a later school year, as the proficiency of the class, or lack of it, may advise.

Geometry is the subject from which the majority of pupils get all the training in deductive reasoning they will ever have. In amount the pupil should cover the whole of Plane Geometry comprised in the text-books now most in use. Exercises, consisting of theorems, problems, and their numerical applications to practical purposes, should be used in addition to the proofs of the text. From one hundred to three hundred such original exercises can be done by the average class.

In advanced Algebra, pupils may proceed from Quadratics, and include the advanced subjects required for college examinations.

In Solid Geometry, the usual amount, including Spherical Geometry, with exercises and applications as in Plane Geometry.

In Trigonometry, the fundamental properties of angles and functions; the standard formulas; solutions of trigonometric equations; inverse functions; solutions of right and oblique triangles, and their application to problems of heights, distances, surveying, and plane sailing; theory and use of logarithmic tables.

In all Mathematics, interest can be added to the work by reference to the history of the science and the lives of eminent mathematicians.

It is desirable that between the ages of twelve and fourteen years pupils acquire the fundamentals of the algebraic notation, including the solution of problems by simple equations, omitting the discussion of negative quantities. In Geometry many facts can be taught in a concrete form, without the use of formal demonstration. This kind of work forms a very valuable introduction to the mathematics of the high school.

It is very important that purely receptive (or memory) work by the pupils should give place as soon as possible to inventive

processes. For this original exercises are excellent, as developing the inventive faculty, and fixing the principles of the text. Much care should be given to the form of demonstrations.

PHYSICAL AND NATURAL SCIENCE

The instruction in these subjects should afford the student useful information regarding the universe in which we live, and to whose laws our lives must be adjusted; and should also afford training in observation and comparison of phenomena, and in tracing the relations of cause and effect in physical processes. In general, the method should be a combination of the didactic instruction furnished by text-books and lectures with the practical methods of the laboratory. Didactic instruction without laboratory work becomes unreal. The pupil memorizes words, and knows little or nothing of objective fact. Laboratory work without a proper measure of didactic instruction becomes desultory, and often degenerates into a mere manual routine. Observations are made and experiments are performed with little appreciation of their meaning, and with no comprehensive view of the relations of the facts. The judicious teacher will give the student enough of observation to make the teaching real, while not losing sight of the relations of facts and phenomena to scientific system. Much of valuable suggestion in regard to the scope and method of instruction in the various sciences can be derived from the report of the Committee of Ten and the conferences held under its auspices, and from the reports on science in secondary schools by the committees recently appointed by various educational bodies under the initiative of the National Educational Association.

The sciences included in the proposed high school curriculum may be divided into three groups: (1) Those dealing with the properties of matter; (2) those dealing with living beings; (3) those dealing with the earth as a unit in a cosmic system. To the first group belong Physics and Chemistry; to the second, Botany, Zoölogy, and Physiology; to the third, Physical Geography, Astronomy, Meteorology, and Geology.

Physics. — An elementary course in Physics is provided in the second half of the second year, and is required of all except the Classical students. This course should furnish a general outline of the knowledge of Mechanics (including the Mechanics of Fluid Bodies), Sound, Light and Heat, Electricity

and Magnetism. Simple experiments should be performed by the students themselves; and experiments which are more difficult and require the use of more costly apparatus should be performed by the teacher. An advanced course in Physics is provided in the second half of the third year. In this course some one or more of the topics outlined in the elementary course should be selected for more intensive study. The experiments performed by the students should be, in general, more strictly quantitative than in the elementary course, and should afford them training in work with instruments of precision.

Chemistry. — An elementary course in Chemistry is provided in the first half of the third year, required of all except Classical students. In this course the student should obtain a knowledge of the outlines of the theory of atoms and molecules and the laws of chemical combination, and should also become familiar with the more common elements and their most important compounds. As in the elementary course in Physics, simple experiments should be performed by the students themselves, while experiments of a more elaborate sort should be shown them by the teacher. In the advanced course in Chemistry in the fourth year, a considerable part of the time should devoted to Qualitative Analysis, and a few exercises should be given illustrating the method of procedure in Quantitative Analysis. Some time should be devoted to a more thorough study of Theoretical Chemistry than is possible in the elementary course, particularly as the principles of chemical philosophy are illustrated in the carbon compounds.

Botany. — Botany is made an elective study in the second half of the first year, but the arrangement of the program is such that it will doubtless be elected by nearly all except the Classical students. A considerable part of the time should be devoted to flowering plants, and the student should learn to identify plants by the use of analytical keys. Exercises in writing descriptions of plants should also be required. While the flowering plants should receive the larger allotment of time, the cryptogams ought not to be ignored, and somewhat of vegetable Physiology and Histology should be taught. The student should be taught to use both the simple and the compound microscope.

Zoölogy. — Zoölogy is made an elective study in the second half of the third year. The student should acquire a knowledge

of the general system of classification of the animal kingdom, and should become familiar with a considerable number of types, by the study of specimens, and by the practice of dissection. Dissections illustrating important points in the classification, but too difficult for the student to make for himself, should be made by the teacher, or should be shown in permanently preserved specimens. Studies of the modes of locomotion and other habits of various groups of animals and of the metamorphosis of insects should be made by observation of the living animals.

Physiology. — A crude and superficial study of Physiology, which cannot be regarded as useless, since the facts of Physiology are so important in their relation to hygiene, is carried on in the primary and grammar schools. There should be in the high school a more truly scientific treatment of Anatomy and Physiology. This is only practicable after the study of Physics and Chemistry, since Physiology is virtually the Physics and Chemistry of the living body. The study is accordingly placed as an elective in the fourth year. There need be no lack of material for objective illustration. The general arrangement of the viscera may be illustrated by the dissection of the cat, and more detailed study of important organs can be made on the heart of the ox or sheep, the brain of the sheep, the eye of the ox, et cetera. Most schools can have a skeleton, anatomical models of some of the most important organs, and some histological preparations which can be shown under the compound microscope. And, although for the most part experiments on living animals are unsuitable in a high school, the circulation of the blood in the web of the frog's foot may well be shown.

Physical Geography. — This study is placed in the first half of the first year, and is required of all students, in the belief that the broad, general view of the earth as man's dwelling-place, which is afforded by this science, is an essential part of a well-rounded education. The principal subjects which should be treated in this course are the earth in its relation to the universe, the atmosphere, the ocean, and the lands. The elementary course in Physical Geography affords thus an introduction to the more advanced elective courses in Astronomy, Meteorology, and Geology, which are provided in the fourth year. Since the elementary course in Physical Geography precedes the study of the other sciences, many of the subjects must

inevitably be treated in a somewhat superficial way. Some of these subjects can be dealt with more thoroughly in the light of the knowledge of Physics and Chemistry, which the student will have acquired when he comes to the more advanced courses of the last year. The work in Physical Geography should be illustrated with maps and photographs, and, if practicable, with relief maps and models. Laboratory work may be furnished in meteorological observations and in the making of weather predictions from the daily weather maps. Many points in regard to the geography of the land, particularly the subject of topographic evolution under the influence of erosion, should be illustrated by excursions.

Astronomy. — This course may be considered a continuation of that part of the course in Physical Geography which treats of the earth in its relation to the universe. It is, of course, very desirable that the school should be provided with a moderate-sized telescope; but, even in the absence of the telescope, objective illustration of many important astronomical principles can be found in observations possible for the naked eye. The study of the constellations with the planisphere is practicable in every school, and is to be emphatically commended.

Meteorology. — This course is in like manner a more advanced development of the study of the atmosphere, given in the introductory course in Physical Geography. Before reaching this course the student will have become familiar with the elements of Physics and Chemistry, and will have made some progress in Mathematics, so that in his fourth year he will be prepared for a more thorough treatment of the subject of Meteorology.

Geology. — The course in Geology should be mainly a course in Structural and Dynamical Geology, and will thus be a more advanced development of the last of the subjects included in the course in Physical Geography. The school should be provided with a well-selected, but not necessarily large, collection of minerals and rocks, and a few fossils. Specimens illustrative of Dynamical Geology are especially important, and are too likely to be overlooked. Excursions in the field form a very important part of efficient geological training. The laboratory of the geologist is out of doors. Historical Geology and Paleontology can be treated generally only in outline. Especially in the state of Connecticut,

where we have no series of fossiliferous rocks accessible, it will be found generally inexpedient to devote much time to Paleontology. A class of students, however, who had already studied Zoölogy, might take up Paleontology with fairly satisfactory results, in a school which was provided with a particularly well-selected collection of fossils. And with regard to the selection of particular topics in Geology and other sciences, there may well be some variation, according to the special tastes and qualifications of the teacher.

A LIST

OF THE

BOARDS OF SCHOOL VISITORS

TOWN SCHOOL COMMITTEES,

AND

BOARDS OF EDUCATION.

The Chairman is indicated in each case by *C.;* the Secretary by *S.;* and Acting Visitor by *A. V.*

Towns.	Names.	P. O. Address.	Term Expires.
Andover,*	M. P. Yeomans,	Andover,	1899
	M. S. Topliff,	"	1899
	H. F. Standish,	"	1899
	S. H. Daggett,	"	1899
	C. L. Backus,	"	1900
	C. B. Stearns,	"	1900
	S. L. French,	"	1900
	Jas. H. Marsh, *S.*,	"	1900
	E. P. Skinner, *C.*,	"	1901
	A. H. Lyman,	"	1901
	R. E. Phelps, *A. V.*,	"	1901
	E. D. White,	"	1901
Ansonia,†	W. B. Camp,	Ansonia,	1899
	Wm. Bowen,	"	1899
	Estelle J. Mills, *A. V.*,	"	1899
	W. H. Kane, *C.*,	"	1900
	C. H. Vandercook,	"	1900
	H. A. Peck, *S.*,	"	1900
	Rev. W. F. Markwick,	"	1901
	Henry W. Case,	"	1901
	R. J. Barry,	"	1901
	W. A. Smith, Supt.,	"	....
Ashford,	Thomas J. Peck, *S.*, *A. V.*,	Warrenville,	1899
	James Knowlton, *C.*, *A. V.*,	West Ashford,	1899
	Harvey W. Morey,	Westford,	1900
	Mrs. Abbie Balch,	Warrenville,	1900
	G. E. S. Amidon,	East Willington,	1901
	Z. B. Bicknell,	Warrenville,	1901
Avon,	Chas. F. Froidevaux,	Collinsville,	1899
	John L. North, *S.*, *A. V.*,	Avon,	1899
	Rev. Chas. K. Fankhauser, *C.*,	"	1900
	Benjamin I. Miller,	"	1900
	Delmore Hadsell,	"	1901
	William Cowles,	"	1901
Barkhamsted,	M. B. Frazier,	Pleasant Valley,	1899
	Frank S. Roberts,	Barkhamsted,	1899
	Frank L. Stephens, *A. V.*,	Riverton,	1900
	Howard D. Moore,	"	1900
	Edward J. Youngs, *C.*,	Pleasant Valley,	1901
	S. H. Case, *S.*, *A. V.*,	Barkhamsted,	1901
Beacon Falls,*	Homer D. Bronson, *C.*, *A. V.*,	Beacon Falls,	1899

* Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
Beacon Falls,*	Daniel J. Carrington,	Beacon Falls,	1899
	Richard J. Beach,	" "	1900
	George T. Clark,	" "	1900
	Cornelius W. Munson,	" "	1901
	John W. Cook, *S.*,	" "	1901
Berlin,	Francis Deming,	Berlin,	1899
	W. J. Corrigan,	Meriden,	1899
	A. A. Barnes, *C.*,	East Berlin,	1899
	W. W. Mildrum,	" "	1899
	John Norton,	Kensington,	1899
	Daniel Webster, *S.*,	Berlin,	1899
	Rev. E. E. Nourse, *A. V.*,	"	....
Bethany,	Charles E. Peck, *C.*, *A. V.*,	Bethany,	1899
	Samuel R. Woodward,	"	1900
	Mrs. Justine C. Coe, *S.*, *A. V.*,	"	1901
Bethel,*	Elliot D. Smith,	Bethel,	1899
	Andrew J. Hallock,	"	1899
	Charles Bailey, *S.*,	"	1899
	Rev. H. L. Slack, *C.*, *A. V.*,	"	1900
	William S. Wortman, *A. V.*,	"	1900
	Thomas C. Mansfield,	"	1900
	Granville A. Durant,	"	1901
	George F. Shepard,	"	1901
	Gideon S. Peck,	"	1901
Bethlehem,	Nehemiah L. Bloss,	Bethlehem,	1899
	Arthur T. Minor,	"	1899
	Samuel P. Hayes, *S.*,	"	1900
	George C. Stone, *A. V.*,	"	1900
	Leverett P. Judd, *C.*, *A. V.*,	"	1901
	Royal B. Lake,	"	1901
Bloomfield,	Adella V. Hubbard,	Bloomfield,	1899
	John McCornick,	"	1899
	Henry C. Cadwell, *S.*, *A. V.*,	"	1899
	Willis F. Rockwell,	"	1900
	Geo. W. Ladd,	"	1900
	Dr. F. A. White,	Bloomfield,	1900
	Alfred N. Filley, *C.*,	Bloomfield,	1901
	W. A. Wadhams,	"	1901
	A. C. Case,	"	1901
Bolton,	Wm. E. Burke,	Highland Park,	1899
	Adelaide E. Sperry, *S.*,	Bolton,	1899
	Mrs. F. R. Eaton,	"	1900
	Edgar A. Brownell, *A. V.*,	Quarryville,	1900
	Dr. Chas. F. Sumner,	Bolton,	1901
	Myron W. Sperry, *C.*,	"	1901
Bozrah,	Thomas Kinkead, *C.*,	Fitchville,	1899
	C. A. Parker, *S.*,	"	1899
	S. G. Johnson, *A. V.*,	"	1899
Branford,*	John J. V. Cunningham, *S.*,	Branford, Lock Box 425,	1899
	Frank E. Smith,	Stony Creek,	1899
	Geo. W. Hull,	Branford,	1899
	Jas. H. Barker,	"	1900
	Llewellyn M. Barker,	"	1900
	Joseph Matson,	"	1900
	Dr. Charles W. Gaylord, *C.*,	"	1901
	Marcus O. Babcock,	"	1901
	M. F. Wallace,	"	1901
	Rev. T. S. Devitt, *A. V.*,	"	....
Bridgeport,*	Edward F. Hallen, *S.*, *A. V.*,	Bridgeport,	1899
	John N. Near, *A. V.*,	"	1899
	Dr. George C. Porter, *A. V.*,	"	1899
	Dr. Chas. C. Godfrey, *A. V.*,	"	1899
	David F. Read, *A. V.*,	"	1900
	Patrick Coughlin, *A. V.*,	"	1900
	Peter Gabriel, *A. V.*,	"	1900
	H. C. Cogswell, *A. V.*,	"	1900
	Peter W. Wren, *C.*, *A. V.*,	"	1901
	Chas. B. Baker, *A. V.*,	"	1901
	Dr. Reuben A. Lockhart, *A. V.*,	"	1901
	Daniel N. Morgan, *A. V.*,	"	1901
	Chas. W. Deane, Supt.,	"	....
Bridgewater,	Marcus B. Mallett, *C.*,	Bridgewater,	1899
	Burton E. Canfield,	"	1899

* Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Bridgewater,	Harmon W. Treat,	Bridgewater,	1900
	Edward R. Wooster,	"	1900
	Stephen P. Treat, *S. A. V.*,	"	1901
	John H. Randall,	"	1901
Bristol,	Mrs. E. M. Peck, *A. V.*,	Bristol,	1899
	Dr. J. J. Wilson,	"	1899
	C. W. Brown,	Forestville,	1900
	C. L. Wooding, *S.*, *A. V.*,	Bristol,	1900
	Dr. A. S. Brackett,	"	1901
	N. E. Pierce, *C.*,	"	1901
Brookfield,	Newman Worden,	Brookfield Center,	1899
	E. N. Hawley, *S.*, *A. V.*,	Hawleyville,	1899
	Francis Barlow,	Brookfield,	1900
	F. S. Curtis,	Brookfield Center,	1900
	Elmer H. Northrop, *C.*,	" "	1901
	Eugene Lake,	" "	1901
Brooklyn,*	Henry H. Green,	Danielson,	1899
	C. S. L. Marlor, *S.*,	Brooklyn,	1899
	Rev. Arthur O'Keefe,	Wauregan,	1900
	Frank Day, *C.*, *A. V.*,	Danielson,	1900
	Harvey P. Robinson,	Brooklyn,	1901
	W. S. Wilcox,	"	1901
Burlington,	Rev. F. A. Holden,	Morris,	1899
	Adrian Moses, *C.*,	Unionville,	1899
	Rev. J. J. Quinn, *A. V.*,	Collinsville,	1900
	Mrs. Sara Bradley, *A. V.*,	Bristol,	1900
	Rev. H. Seil, *S.*, *A. V.*,	Burlington,	1901
	F. M. Butler,	"	1901
Canaan,	Rev. C. W. Hanna, *S.*, *A. V.*,	Falls Village,	1899
	Geo. Frink, *C.*,	"	1899
	Dr. Francis Skiff, *A. V.*,	"	1899
	C. E. Ford,	"	1899
	Nelson J. Dean,	Huntsville,	1899
	Levi Ganser, *A. V.*,	"	1899
Canterbury,	Andrew T. J. Clark,	Brooklyn,	1899
	Miss Susie E. Witter, *A. V.*,	Packerville,	1899
	Miss Olive D. Sanger,	Canterbury,	1899
	Dr. John O. Smith, *A. V.*,	South Canterbury,	1900
	Dwight B. Bushnell,	Canterbury,	1900
	Mrs. Sarah B. Hadley, *S.*,	South Canterbury,	1901
	Chauncey C. Frink, *C.*,	Canterbury,	1901
	Mrs. Carrie L. Ensworth,	Brooklyn,	1901
Canton,*	W. J. Soudant,	Collinsville,	1899
	C. A. Farnum,	"	1899
	H. L. Sanborn, *S.*,	"	1899
	Henry Humphrey,	Canton Center,	1900
	G. B. Fen,	Canton,	1900
	G. A. Sisson,	Canton Center,	1900
	James Case,	Collinsville,	1901
	W. H. Sullivan,	"	1901
	William Hill, *C.*, *A. V.*,	"	1901
Chaplin,*	Merrick Barton,	Chaplin,	1899
	Charles S. Turner,	"	1899
	Dr. Charles M. Knight,	"	1900
	Frank C. Lummis, *S.*,	"	1900
	Rev. Eugene M. Frary, *A. V.*,	"	1901
	Jared W. Lincoln, *C*,	"	1901
Chatham,	Ernest G. Cone,	East Hampton,	1899
	S. Mills Bevin,	" "	1899
	Mrs. Florence C. Strong, *A. V.*,	Cobalt,	1899
	A. H. Conklin, *C.*,	East Hampton,	1900
	David B. Dickinson,	Cobalt,	1900
	W. F. Brainard,	East Hampton,	1900
	Rev. Geo. H. Lamson, *S.*, *A. V.*,	" "	1901
	Dr. Levi Jewett,	Cobalt,	1901
	W. W. B. Markham,	East Hampton,	1901
Cheshire,	Dr. M. N. Chamberlain, *C.*,	Cheshire,	1899
	James E. McCabe,	"	1899
	Charles M. Hotchkiss,	"	1899
	Charles T. Hotchkiss,	West Cheshire,	1899
	Dr. Edward T. Cornwall,	Cheshire,	1899
	Frederick Doolittle, *S.*, *A. V.*,	"	1899
Chester,*	Dr. F. S. Smith,	Chester,	1899

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Chester,*	Andrew E. Warner, *A. V.*,	Chester,	1899
	Carlton J. Bates, *C.*,	"	1900
	Leonard R. Bishop,	"	1900
	J. Tyler Smith,	"	1901
	Fred. W Silliman, *S.*,	"	1901
Clinton,*	Hosmer A. Tryon,	Clinton,	1899
	F G. Woodstock,	"	1899
	Oliver B. Swain,	"	1899
	Clifford Evarts,	"	1899
	Henry L. Wellman,	"	1900
	Lucius J. Stevens,	"	1900
	George E. Elliot, *C.*, *A. V.*,	"	1900
	Sam'l S. Wilcox, *A. V.*,	"	1900
	Henry Stevens,	"	1901
	Sturgis G. Redfield, *S.*,	"	1901
	Alonzo H. Stevens,	"	1901
	James A. Spencer,	"	1901
Colchester,	E. E. Brown, *A. V.*,	Comstock's Bridge,	1899
	Rev. M. H. May,	Colchester,	1899
	Rev. E. C. Ingalls, *S.*,	"	1900
	J. J. Sullivan, *A. V.*,	"	1900
	Samuel P. Willard, *C.*,	"	1901
	John F. Slater,	"	1901
Colebrook,	S. A. Cooper, *A. V.*,	Colebrook,	1899
	Howard Smith, *C.*,	"	1899
	Francis H. Bushnell,	Colebrook River,	1899
	Homer P. Deming, *S.*,	Robertsville,	1900
	Curtis P. Wedge,	"	1900
	Eugene Mulcahy,	Station A, Winsted,	1900
	John F. Peck,	Colebrook River,	1901
	Robert E. Lawrence,	Mill Brook,	1901
Columbia,	Joseph N. Clark,	Columbia,	1899
	J. P. Harvey,	"	1899
	William A. Collins, *C.*,	"	1900
	Wm. H. Yeomans, *S.*, *A. V.*,	"	1900
	Wm. C. Robinson,	Hebron,	1901
	Albert Brown,	Columbia,	1901
Cornwall,*	C. W. Everett,	Cornwall Bridge,	1899
	F. A. Whitcomb,	Cornwall,	1899
	B. E. Yale,	Cornwall Hollow,	1899
	L. J. Nickerson, *C.*,	West Cornwall,	1900
	C. L. Gold, *A. V.*,	" "	1900
	David L. Smith,	" "	1900
	George C. Harrison,	" "	1901
	Miner P. Rogers,	" "	1901
	Philo M. Kellogg, *S*, *A. V.*,	Cornwall,	1901
Coventry,	Alexander S. Hawkins, *A. V.*,	Willimantic,	1899
	Andrew Kingsbury, *A. V.*,	Coventry,	1899
	Mrs. Ellen L. Topliff, *A. V.*,	South Coventry,	1900
	George H. Robertson, *A. V.*,	Willimantic,	1900
	John Brown, *S.*, *A. V.*,	Merrow,	1901
	Charles R. Hall, *C.*, *A. V.*,	Coventry,	1901
Cromwell,*	Wm. E. Hulbert,	Cromwell,	1899
	Rev. H. G. Marshall, *C.*, *A. V.*,	"	1899
	Thos. D. Simpson,	"	1899
	C. E. Blake,	"	1900
	F. C. Hick,	"	1900
	F. K. Hallock, *S.*,	"	1900
	Chas. T. Pratt,	Little River,	1901
	H. C. Edwards,	Cromwell,	1901
	George E. Marsh,	"	1901
Danbury,	William D. Lane, *C.*, *A. V.*,	Danbury,	1899
	Rev. A. C. Hubbard, *S.*, *A. V.*,	"	1899
	Benedict Starr, *A. V.*,	"	1900
	Rev. John D. Kennedy, *A. V.*,	"	1900
	Howard B. Scott, *A. V.*,	"	1901
	Dr. Nathaniel Selleck, *A. V.*,	"	1901
Darien,	Dr. George H. Noxon, *S.*,	Darien,	1899
	J. Waterbury Smith,	Noroton Heights,	1899
	Rev. Arthur Requa, *A. V.*,	Noroton,	1900
	Geo. Gregory,	Noroton Heights,	1900
	Dr. W. G. Brownson, *C.*, *A. V.*,	" "	1901
	William T. Andrews,	" "	1901

* Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Derby,†	Dr. George L. Beardsley, *C.*,	Derby,	1898
	Edward Condon,	"	1898
	Sidney E. Gesner,	"	1898
	Robert L. Gilbert,	"	1898
	John McEnerney,	"	1898
	John Reilly,	"	1898
	John Larkin, *S.*,	"	....
Durham,	Stephen A. Seward,	Durham Center,	1899
	Geo. W. Newton, *S.*,	" "	1899
	Mary J. Camp,	" "	1900
	Rev. Joseph Hooper, *C.*, *A. V.*,	Durham,	1900
	Mrs. Ellen Matthewson, *A. V.*,	"	1901
	William T. Coe,	Durham Center,	1901
Eastford,	S. A. Wheaton,	Phœnixville,	1899
	Rev. C. M. Jones, *S.*, *A. V.*,	Eastford,	1899
	S. O. Bowen, *C.*,	"	1900
	Rev. J. P. Trowbridge,	"	1900
	M. F. Latham,	Phœnixville,	1901
	S. C. Simons,	Eastford,	1901
East Granby,	James Holmes,	East Granby,	1899
	J. G. Dickinson,	"	1899
	B. P. Clark, *S.*, *A. V.*,	"	1900
	A. B. Phelps,	Copper Hill,	1900
	Chas. W. Bates, *C.*,	East Granby,	1901
	J. R. Holcomb,	"	1901
East Haddam,	Mrs. Emma H. Chaffee, *A. V.*,	Moodus,	1899
	Miss Sarah Parker, *A. V.*,	East Haddam,	1899
	Julius Attwood, *C.*, *A. V.*,	" "	1899
	Nelson H. Bowen, *A. V.*,	Moodus,	1899
	John B. Gelston, *A. V.*,	East Haddam,	1899
	Norris W. Rathbun, *S.*, *A. V.*,	Millington,	1899
East Hartford,	Rev. Francis P. Bacheler, *A. V.*,	Hockanum,	1899
	Dr. Thos. S. O'Connell,	East Hartford,	1899
	Miss Annie E. Olmstead, *A. V.*,	" "	1899
	Rev. Geo. A. Bowman, *A. V.*,	" "	1900
	F. Howard Ensign, *C.*,	Silver Lane,	1900
	Elijah Ackley,	East Hartford,	1900
	Joseph O. Goodwin, *S.*, *A. V.*,	" "	1901
	Samuel N. Brainard,	" "	1901
East Haven,*	Wm. H. Robinson, *A. V.*,	East Haven,	1899
	Miss Lottie E. Street, *A. V.*,	"	1899
	Albert A. Page,	"	1899
	Edward F. Thompson,	"	1900
	Henry P. Thompson,	"	1900
	Fred'k L. Hawkins, *S.*, *A. V.*,	"	1900
	Samuel K. Chidsey, *A. V.*,	"	1901
	William K. Stevens,	"	1901
	Grove J. Tuttle, *C.*, *A. V.*,	"	1901
East Lyme,*	Dr. Frederic H. Dart, *C.*,	Niantic,	1899
	Benjamin K. Chapman,	East Lyme,	1899
	George P. Hill,	Niantic,	1899
	D. L. Gates,	"	1900
	Eugene Beckwith,	"	1900
	Frank P. Bacon, *S.*,	"	1900
	C. S. Davis,	"	1901
	Daniel Frazier,	"	1901
	Frank A. Fox,	East Lyme,	1901
	Miss Celeste E. Bush, *A. V.*,	Niantic,	....
Easton,*	Henry W. Osborne, *C.*, *A. V.*,	Easton,	1899
	S. B. Turney, *S.*, *A. V.*,	"	1899
	George B. Beers, *A. V.*,	Plattsville,	1900
	Geo. J. Banks, *A. V.*,	Easton,	1900
	Geo. S. Gillette, *A. V.*,	Adams,	1901
	Charles Everett, *A. V.*,	Easton,	1901
East Windsor,*	Mrs. Harriette L. Price, *A. V.*,	Warehouse Point,	1899
	George S. Phelps,	" "	1899
	Orson S. Wood, *S.*, *A. V.*,	Windsorville,	1899
	Rev. Wm. F. English, *C*, *A. V.*,	East Windsor,	1900
	John B. Noble,	East Windsor Hill,	1900
	Lyman B. Griffin,	Warehouse Point,	1900
	Howard O. Allen, *A. V.*,	Broad Brook,	1901
	William Lasbury,	" "	1901

*Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
East Windsor,*	Rev. Arthur H. Wright,	Warehouse Point,	1901
Ellington, *	Albert Pinney,	Rockville,	1899
	Lucius A. Aborn,	Crystal Lake,	1899
	W. H. Skinner,	Rockville,	1899
	J. M. Marks, *S.*,	Ellington,	1900
	E. T. Davis, *A. V.*,	"	1900
	J. D. Beasley,	"	1900
	M. H. Aborn,	"	1901
	C. A. Thompson,	Melrose,	1901
	J. T. McKnight, *C.*, *A. V.*	Ellington,	1901
Enfield,*	Amos D. Bridge,	Hazardville,	1899
	Dr. Geo. T. Finch, *A. V.*,	Thompsonville,	1899
	Ashmun P. Prickett, *A. V.*,	Hazardville,	1899
	Dr. J. Homer Darling,	Thompsonville,	1900
	Samuel A. Booth, *C.*,	Enfield,	1900
	Rev. Oliver W. Means, *A. V.*,	"	1900
	Geo. B. Fowler,	Thompsonville,	1901
	Olin S. Olmstead,	Melrose,	1901
	Arthur R. Leete, *S.*, *A. V.*,	Thompsonville,	1901
Essex,*	Dr. W. P. Chipman, *A. V.*,	Essex,	1899
	E. T. Pratt, *C.*, *A. V.*,	"	1899
	William Baker,	"	1899
	Dr. Alonzo Shaffer,	"	1899
	Thos. D. Coulter,	"	1900
	John Halliday,	"	1900
	W. H. Wright,	Centerbrook,	1900
	Egbert I. Norton,	Essex,	1900
	Charles Harrington, *S.*,	"	1901
	C. P. Jones,	Ivoryton,	1901
	R. H. Comstock,	"	1901
	H. W. Webber,	Essex,	1901
Fairfield,*	Rev. T. J. Coleman, *A. V.*,	Fairfield,	1899
	Moses E. Banks, *S.*, *A. V.*,	Box 213, Bridgeport,	1899
	John Hawkins, *C.*, *A. V.*,	Southport,	1900
	Michael B. Lacey, *A. V.*,	Plattsville,	1900
	Dr. M. V. B. Dunham, *A. V.*,	Greenfield Hill,	1901
	Wm. C. Kinsella, *A. V.*,	Fairfield,	1901
Farmington,	Geo. F. Dunning,	Farmington,	1899
	John Riley,	"	1899
	Mrs. Lilian E. Root, *A. V.*,	"	1899
	H. W. Barbour, *S.*,	"	1899
	Rev. Wm. H. Redding, *A. V.*,	Unionville,	1900
	Nelson O. Keyes,	Farmington,	1900
	George Dunham, *C.*,	Unionville,	1901
	John P. Lewis,	"	1901
	Charles Brandegee,	Farmington,	1901
Franklin,*	Chas. H. Peckham, *C.*, *A. V.*,	Yantic,	1899
	George H. Griffing,	Franklin,	1899
	Clayton H. Lathrop, *S.*, *A. V.*,	North Franklin,	1900
	Michael E. Mullen,	Franklin,	1900
	Louis H. Smith,	Yantic,	1901
	Henry Bellows,	Baltic,	1901
Glastonbury,	A. A. Babcock, *C.*, *A. V.*,	South Glastonbury,	1899
	Rev. F. H. Spear, *A. V.*,	East Glastonbury,	1899
	Rev. J. H. Hutchins, *A. V.*,	Glastonbury,	1900
	W. I. Goodale, *A. V.*,	Addison,	1900
	J. P. Cornish, *A. V.*,	Naubuc,	1901
	Mrs. Julia T. Clark, *S.*, *A. V.*,	South Glastonbury,	1901
Goshen,*	Rev. H E. Small, *A. V.*,	Goshen,	1899
	N. R. Tibbals,	Winchester Center,	1899
	John M. Wadhams, *C.*,	Goshen,	1900
	Charles A. Palmer,	"	1900
	Frederick W. Lucas, *S.*,	West Goshen,	1901
	Rev. A. G. Creamer,	Goshen,	1901
Granby,	Henry J. Dewey,	Granby,	1899
	Charles B. Case,	West Granby,	1899
	Dr. Rollin B. Chatfield,	Granby,	1899
	O. D. Case,	Granby,	1900
	Porter Reed,	West Granby,	1900
	Arthur Rice,	Granby,	1900
	C. P. Loomis,	Granby,	1901
	L. C. Spring, *C.*, *A. V.*,	Granby,	1901

* Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Granby,	F. J. Jewett, *S.*, *A. V.*,	Granby,	1901
Greenwich,	Henry C. Boswell, *A. V.*,	Greenwich,	1899
	Isaac L. Mead, *C.*, *A. V.*,	"	1899
	Thomas H. Delano, *A. V.*,	"	1900
	Willys R. Monroe, *A. V.*,	Coscob,	1900
	Silas E. Mead, *A. V.*,	Round Hill,	1901
	Thomas F. Hawley, *S.*, *A. V.*,	Glenville,	1901
Griswold,	Rollin R. Church,	Jewett City,	1899
	William R. Palmer, *C.*,	"	1899
	Byron P. Young,	Glasgo,	1899
	James T. Wilbur,	"	1900
	Daniel L. Phillips,	Jewett City,	1900
	John D. Eccleston,	"	1900
	John A. Owen,	"	1901
	John C. Hawkins,	"	1901
	John Potter, *S.*, *A. V.*,	Griswold,	1901
Groton,	Horace Clift, *C.*, *A. V.*,	Mystic,	1899
	Augustin S. Chester, *A. V.*,	Noank,	1899
	Joseph Hull, *A. V.*,	Old Mystic,	1900
	Chas. R. Heath, *S.*, *A. V.*,	Mystic,	1900
	Mrs. Clara B. Whitman, *A. V.*,	Groton,	1901
	Miss Alice E. Turner, *A. V.*,	"	1901
Guilford,	John W. Norton,	Guilford,	1899
	Dr. R. B. West,	"	1899
	Erastus Dudley,	North Guilford,	1899
	Rev. Geo. W. Banks, *C.*, *A. V.*,	Guilford,	1900
	Dr. Geo. H. Beebe, *S.*, *A. V.*,	"	1900
	Edward M. Leete,	"	1900
	Florence Shelley,	"	1901
	E. Walter Leete,	Leete's Island,	1901
	Erwin W. Rossiter, *A. V.*,	North Guilford,	1901
Haddam,	Rev. T. C. Richards,	Higganum,	1899
	Gustaf B. Carlson,	"	1899
	Rev. E. E. Lewis, *S.*, *A. V.*,	Haddam,	1899
	E. P. Arnold,	"	1900
	Peter A. Nelson,	Higganum,	1900
	Orrin Shailer,	Shailerville,	1900
	Dr. LeRoy A. Smith, *C.*,	Higganum,	1901
	Robert B. Clark,	"	1901
	Ira G. Bailey,	"	1901
Hamden,*	Sereno T. Cook,	Mount Carmel Center,	1899
	Burton A. Davis, *C.*,	Whitneyville,	1899
	Hubert E. Warner,	33 Broadway, N. Haven,	1899
	William J. Dullard,	Mount Carmel,	1900
	John M. Hindinger,	Highwood,	1900
	Alfred E. Ives,	Box 1071, New Haven,	1900
	Gilbert S. Benham,	Hamden,	1901
	George L. Clark,	"	1901
	Rev. Chas. F. Clarke, *S.*, *A. V.*,	Whitneyville,	1901
	Cullen B. Foote, *A. V.*,	Box 888, New Haven,	....
Hampton,	Henry Clapp,	Rawson,	1899
	C. B. Jewett,	Hampton,	1899
	Austin E. Pearl, *C.*,	"	1899
	Allen Jewett,	Clark's Corners,	1900
	Joseph W. Congdon, *S.*, *A. V.*,	Howard's Valley,	1900
	Rev. Charles Morgan,	Hampton,	1900
	Frank E. Whittaker,	"	1901
	Everett Elliott, *A. V.*,	Elliott,	1901
	George Kimball,	Rawson,	1901
Hartford,	James H. Jarman, *C.*,	Hartford, 783 Main st.,	1899
	Henry Bryant,	" 1260 "	1899
	Joseph P. Tuttle, *S.*,	" 50 State st.,	1899
	Mrs. Welthea T. Day,	" 121 Main st.,	1900
	Leonard A. Dickinson,	" 664 "	1900
	Thomas F. Kane,	" 517 "	1900
	Thomas S. Weaver,	" 115 Wooster st.,	1901
	Howard G. Bestor,	" 82 Pearl st.,	1901
	Herbert S. Bullard, *Supt.*,	" 2 Central Row,	1901
Hartland,	D. N. Gaines, *C.*,	East Hartland,	1899
	E. A. Gaylord, *A. V.*,	West Hartland,	1899
	Carlton Osborn,	West Hartland,	1900

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Hartland,	Edward Collins,	East Hartland,	1900
	Edgar B. Case, *S., A. V.*,	"	1901
	D. C. Stratton,	West Hartland,	1901
Harwinton,*	Martin L. Goodwin,	Harwinton,	1899
	Walter S. Balch,	"	1899
	Albert G Wilson,	"	1900
	Eugene W. Hinman,	"	1900
	Wm. J. Barber, *C.*,	"	1901
	Dr. Chas. L. Blake, *S., A. V.*,	"	1901
Hebron,	Charles G. Allyn,	Turnerville,	1899
	Hart E. Buell,	Gilead,	1899
	William W. Jones,	Hebron,	1899
	Frank R. Post,	"	1900
	Loren A. Waldo, *C.*,	"	1900
	Charles L. Phelps,	"	1900
	Henry A. Spaford,	"	1901
	Dr. C. H. Pendleton, *S., A. V.*,	"	1901
	Arthur E. Hutchinson,	Gilead,	1901
Huntington,*	Frederick Durand, *A. V.*,	Shelton,	1899
	Peter Reilley,	Derby,	1899
	D. S. Brinsmade, *C.*,	Shelton,	1900
	Andrew Dean,	"	1900
	Edward S. Hawley. *A. V.*,	Huntington,	1901
	Horace Wheeler, *S.*,	Shelton,	1901
Kent,	G. A. Vincent,	Kent,	1899
	John Slosson, *A. V.*,	Kent Furnace,	1899
	John Chase, *C.*,	South Kent,	1900
	Chas L. Spooner, *S., A. V.*,	Bull's Bridge,	1900
	Irwin J. Beardsley, *A. V.*,	New Preston,	1901
	Egbert A Morehouse, *A. V.*,	South Kent,	1901
Killingly,*	Frank J. Sayles,	Dayville,	1899
	James M. Paine. *A. V.*,	East Killingly,	1899
	Fred E. Bitgood, *C.*,	Danielson,	1899
	Albert D. Putnam. *S.*,	"	1900
	Dr. Charles E. Hill,	East Killingly,	1900
	Henry C. Warren,	Danielson,	1900
	William E. Atwood,	Killingly,	1901
	John A. Paine,	Danielson.	1901
	James H. Potter,	"	1901
Killingworth,*	J. S. Griswold,	Killingworth,	1899
	E. P. Nichols,	"	1899
	D. K. Stevens, *C.*,	"	1900
	N. H Evarts,	"	1900
	L. L. Nettleton, *S., A. V.*,	Madison,	1901
	H. F. Marquard,	Killingworth,	1901
Lebanon,	Rev. R. E. Turner, *C., A. V.*,	Lebanon,	1899
	Isaac Gillette, *S., A. V.*,	"	1900
	Charles Taylor, Jr., *A. V.*,	Colchester,	1900
Ledyard,	Joseph A. Gallup, *C., A. V.*,	Old Mystic,	1901
	Thos. P. Norman, *S., A. V.*,	Shewville,	1901
	Zepheniah Brown,	Old Mystic,	1901
Lisbon,	Henry Lyon,	Greeneville,	1899
	H. L. Reade,	Jewett City,	1899
	Rev. John W. Payne, *C., A. V.*,	" "	1900
	George G. Bromley, *S., A. V.*,	" "	1900
	R. W. Fitch,	Versailles,	1901
	J. B. Palmer, Jr.,	Jewett City,	1901
Litchfield,*	George W. Mason, *C., A. V.*,	Litchfield,	1899
	George A. Smith, *A. V.*,	Milton,	1899
	Jas. P. Woodruff, *A. V.*,	Litchfield,	1900
	James P. Catlin, *A. V.*,	Northfield,	1900
	Elbert P. Roberts, *S., A. V.*,	Litchfield,	1901
	Chas. D. Kilbourn, *A. V.*,	Bantam,	1901
Lyme,	H B. Sisson, *A. V.*	Hamburgh,	1899
	James Daniels,	"	1899
	Rev. E. F. Burr, *C.*,	Lyme,	1900
	Charles F. Beebe,	Hamburgh,	1900
	J. Ely Beebe,	North Lyme,	1901
	Rev. J. G. Ward, *S.*,	"	1901
Madison,*	Joseph D. Kelsey, *C.*,	Madison,	1899
	Alveno D. Ayer,	"	1899
	Berton B. Munger,	East River,	1899

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Madison,*	W. D. Whedon,	Madison,	1899
	John H. Meigs, *S.*,	"	1900
	W. W. Crampton,	"	1900
	Chas. H. Parker,	North Madison,	1900
	Frank C. Dowd,	Madison,	1901
	J. Myron Hull,	"	1901
	Myron H. Munger, *A. V.*,	North Madison,	1901
	Charles H. Dudley,	Clinton,	1901
	Miss Mary G. Redfield, *A. V.*,	Madison,	....
Manchester,	E. A. Lydall, *C.*, *A. V.*,	Manchester,	1899
	Robert P. Bissell,	"	1899
	Rev. J S. Wadsworth, *A. V.*,	South Manchester,	1900
	Rev. F. J. Murphy, *A. V.*,	Manchester,	1900
	Clinton W. Cowles,	"	1901
	Herbert O. Bowers, *S.*, *A. V.*,	"	1901
Manchester,‡ (Ninth District.)	John S. Cheney, *C.*, *A. V.*,	South Manchester,	1899
	Rev. J. S. Wadsworth, *A. V.*,	" "	1899
	Rev. W. J. McGurk, *A. V.*,	" "	1900
	Anna L. Biddle, *A. V.*,	" "	1901
	C. S. Cheney, *S.*,	" "	1901
Mansfield,	Arthur B. Peebles,	Storrs,	1899
	Edmund W. Ellison,	Willimantic,	1899
	Herbert O. Huntington,	Mansfield Center,	1899
	C. Edna Remington,	Willimantic,	1900
	G. O. Southwick,	Mansfield,	1900
	Henry W. Hanks,	Spring Hill,	1900
	Andrew M. Grant, *S.*, *A. V.*,	Mount Hope,	1901
	Dr. Edwin G. Sumner, *C.*,	Mansfield Center,	1901
	Henry Huntington, *A. V.*,	Mansfield Depot,	1901
Marlborough,	Rev. E. H. Jenkyns, *C. S.*,	Marlborough,	1899
	Wm. W. Bolles,	"	1899
	J. L. Ryan, *C.*,	"	1900
	Banks Jones, *A. V.*,	No. Westchester,	1900
	Amelia Coleman,	Marlborough Mills,	1901
	Elizabeth Day,	Marlborough,	1901
Meriden,*	George M. Howell,	South Meriden,	1899
	Benj. W. Collins,	Meriden,	1899
	Dr. Andrew W. Tracy,	"	1899
	George B. Murdock,	"	1899
	Saxton B. Little,	"	1900
	Charles E. Stockder, Jr.,	"	1900
	Thomas King,	"	1900
	Thos. L. Reilly,	"	1900
	Charles L. Upham,	"	1901
	Homer A. Curtiss, *S.*,	"	1901
	Dr. C. H. S. Davis, *C.*,	"	1901
	Napoleon P. Forcier,	"	1901
	A. B. Mather, *Supt.*,	"	....
Middlebury,	Artisan S. Clark, *A. V.*,	Middlebury,	1899
	William Jerman,	Waterbury,	1899
	Dwight Atwood,	Middlebury,	1900
	Mrs. Eli Bronson, *S.*,	"	1900
	Miss M. L. Townsend,	"	1901
	A. W. Bissell, *C.*,	"	1901
Middlefield,	C. N. Burnham, *C.*,	Middlefield,	1899
	Lucy J. Miller,	"	1899
	John Cronin,	Rockfall,	1899
	Otis A. Smith,	"	1899
	V. H. Coles,	"	1899
	Henry S. Steele, *S.*,	Middletown,	1899
	Miss Frances W. Perkins, *A. V.*,	Middlefield,	1899
Middletown,	Charles Reynolds, *S.*,	Middletown,	1899
	J. G. Hopkins, *A. V.*,	"	1899
	Murray Closson, *A. V.*,	"	1900
	James K. Guy, *C.*,	"	1900
	Herbert E. Smith,	"	1901
	Charles E. Bacon, *A. V.*,	"	1901
Middletown,† (City District.)	Wm. T. Elmer, *C.*,	"	1899
	D. J. Donahoe,	"	1899
	William S. Whitney,	"	1899
	Fred E. Gibbons,	"	1900
	Lyman D. Mills,	"	1900
	John G. Palmer,	"	1900
	W. U. Pearne, *S.*,	"	1901
	Dr. Leonard Bailey, *A. V.*,	"	1901
	George A. Craig,	"	1901

*Town School Committee. † Board of Education. ‡ School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Milford,*	William G. Mitchell,	Milford,	1899
	George M. Gunn,	"	1899
	David E. Smith,	"	1899
	Albert A. Baldwin, *C.*,	"	1899
	William B. Brotherton,	"	1900
	C. A. Tomlinson, *S.*,	"	1900
	G. Frank Smith,	"	1900
	C. A. L. Totten,	"	1900
	Nathan E. Smith, *A. V.*,	Woodmont,	1901
	Robert W. Clark,	Milford,	1901
	Charles W. Beardsley,	"	1901
	Jervis D. Brown,	"	1901
Monroe,	Edwin C. Shelton, *C.*, *A. V.*,	Monroe,	1899
	Chas. E. Osborne, *S.*, *A. V.*,	Stepney,	1899
Montville,	Joseph S. Latimer,	Montville,	1899
	Olin F. Boynton,	Gardner's Lake,	1899
	Robert C. Burchard, *C.*, *A. V.*,	Montville,	1899
	Sam'l W. Strickland, *S.*, *A. V.*,	Chesterfield,	1899
	E. W. Coggeshall,	Uncasville,	1899
	W. S. Richmond,	Oakdale,	1899
	Morton E. Fox,	Uncasville,	1899
	Silas H. Browning, *A. V.*,	Oakdale,	1899
	Charles F. Bartlett,	Uncasville,	1899
Morris,	Dwight Griswold,	West Morris,	1899
	Silas E. Stockman, *S.*, *A. V.*,	East Morris,	1899
	Homer Stoddard, *C.*, *A. V.*,	West Morris,	1900
	Dea. Samuel A. Whittlesey,	Morris,	1900
	Wm. F. Kirchberger,	East Morris,	1901
	Joel W. Skilton,	"	1901
Naugatuck,	Rev. Wm. J. Fanning,	Naugatuck,	1899
	Dr. T. M. Bull, *A. V.*,	"	1899
	Rev. J. W. Ellsworth, *S.*, *A. V.*,	"	1900
	Wm. T. Rodenbach,	"	1900
	Dr. W. J. Delaney, *C.*, *A. V.*,	"	1901
	A. H. Dayton, *A. V.*,	"	1901
New Britain,*	E. H. Davison,	New Britain,	1899
	Philip J. Markley, *C.*,	"	1899
	Charles S. Andrews,	"	1899
	Morris C. Webster,	"	1899
	M. J. Coholan,	"	1900
	John Walsh,	"	1900
	W. F. Walker,	"	1900
	Louis E. C. Teich,	"	1900
	R. G. Hibbard, *S.*,	"	1901
	Dennis Riordan,	"	1901
	James Roche,	"	1901
	L. Hoyt Pease,	"	1901
	G. A. Stuart, *Supt.*,	"	....
New Canaan,*	Benjamin P. Mead, *C.*,	New Canaan,	1899
	Lewis C. Hall,	"	1899
	C. Elbert Brinckerhoff,	"	1899
	Rev. James H. Hoyt,	"	1900
	Clarence H. Scoville,	"	1900
	Geo F. Lockwood,	"	1900
	G. D. Nichols,	"	1901
	B. F. Hoyt,	"	1901
	Henry Kelley, *S.*,	"	1901
	George W. Gamble, *Supt.*,	"	....
New Fairfield,	Walter Chatterton,	New Fairfield,	1899
	David H. Disbrow,	"	1899
	E. H. Pearse,	"	1900
	H. H. Wildman, *C.*,	"	1900
	Henry J. Dayton,	"	1901
	J. J. Treadwell, *S.*, *A. V.*,	"	1901
New Hartford,*	G. C. Beckwith, *C.*, *A. V.*,	Nepaug,	1899
	Frank M. Chapin,	Pine Meadow,	1899
	F. O. Clarke, *S.*,	New Hartford,	1900
	Henry T. Smith,	"	1900
	Fred B. Jones,	"	1901
	Riley M. Olmsted,	Nepaug,	1901
	Rev. Frank S. Brewer, *A. V.*,	New Hartford,	....
New Haven† (City District).	Walter J. Connor,	New Haven, 1439 State st.	1899
	Eli Whitney, *C.*,	" 78 Crown st.,	1899

*Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
New Haven,†..... (City District.)	Thomas Hooker,..	New Haven,233 C'rch st.,	1900
	Harry W. Asher, ...	" 865 Chapel st.,	1900
	Jas. T. Moran, ...	" 42 C'rch st.,	1901
	Fred. A. Betts, ...	" 42 "	1901
	A. J. Harmount, ...	" 78 Water st.,	1902
	Horace Day, *S*., ...	"	...
	Calvin N. Kendall, *Supt.*, ..	"	....
New Haven,†..... (Westville District.)	L. Wheeler Beecher, *C*.,. ..	Westville,..	1899
	Burton Dickerman, ...	"	1899
	Thomas McClure,.	"	1899
	A. N. Farnham, ...	"	1900
	M. E Terrell, ...	"	1900
	Amos Dickerman, ...	"	1900
	Hobart L. Hotchkiss, *S*., *A. V*.,	"	1901
	M. J. Powers, ...	"	1901
	Robert T. Grant, ...	"	1901
New Haven,..... (South District.)	Charles Douglass, *A. V*., ..	Morris Cove, New Haven,	1899
	Charles Wilcox, *A. V*., ..	" "	1899
	Fred'k Van Sickels, *C*., *A. V*., .	" "	1899
	Julius H Morris, *S*., ...	" "	....
Newington,*.....	Mrs. Jedediah Deming, *S*., ..	Newington, ...	1899
	D. W. Fish, ...	"	1899
	F. C. Latimer, *C*., ...	New Britain, ...	1900
	J. W. Camp, ...	Newington Junction, ..	1900
	Thomas Callahan, ...	Newington, ...	1901
	Rev. Herbert Macy, *A. V*., ..	"	1901
New London,*.....	Frederic S. Newcomb, ...	New London, ...	1899
	P. Hall Shurts, ...	" "	1899
	Frank E. Barker, ...	" "	1899
	Dr. John G. Stanton, *C*., ..	" "	1900
	Dr. Geo. S. Morgan, ...	" "	1900
	Lee S. Denison, *S*., ...	" "	1900
	Charles J. Hewitt, ...	" "	1901
	H. P. Bullard, ...	" "	1901
	Colin S Buell, ...	" "	1901
	Chas. B. Jennings, *Supt.*, ..	" "	....
New Milford,*....	Chauncey B. Marsh, ...	New Milford, ...	1899
	J. Butler Merwin, ...	"	1899
	Charles N. Hall, ...	"	1899
	George W. Richmond,... ..	"	1899
	Francis E. Baldwin, *C*., . ..	Northville, ...	1900
	W. G. Barton, ...	New Milford, ...	1900
	W. G. Green, ...	"	1900
	Charles H. Soule, *A. V*., ..	Gaylordsville, ...	1900
	John F. Addis, ...	New Milford, ...	1901
	Albert Evitts, *S*., ...	"	1901
	V. B. Sterling, ...	"	1901
	Cyrus A. Todd, ...	"	1901
Newtown,.....	Dr. J. W. Gordon, *A. V*., ..	Sandy Hook, ...	1899
	Rev. Otis O. Wright, ...	"	1899
	John F. Houlihan, *A. V*., ..	Newtown, ...	1900
	William J. Brew, *C*., *A. V*., ..	Sandy Hook, ...	1900
	John J. Northrop, *S*., *A. V*.,..	Newtown, ...	1901
	Ezra L. Johnson, *A. V*., ..	"	1901
Norfolk,.....	Edmund Brown, *C*., ...	Norfolk, ...	1899
	John C. Kendall, *A. V*., ..	"	1899
	Edward J. Trescott, ...	"	1899
	John D. Bassett, *S*., *A. V*., ..	"	1900
	William A. Spaulding, ...	"	1900
	William O'Connor, ...	"	1900
	Howard W. Carter, ...	"	1901
	Burritt Darrow, ...	"	1901
	Michael M. Dalton, ...	"	1901
North Branford,.....	R. M Rose, ...	North Branford, ...	1899
	T. A. Smith, ...	Northford, ...	1899
	Newton M. Robinson, ...	North Branford,.. ..	1900
	Rev. W. J. Brewster, *C*., *A. V*.,	Northford, ...	1900
	Rev. F. Countryman, *S*., *A. V*.,	North Branford, ...	1901
North Canaan,*.....	Martin F. McCarty, ...	Canaan, ...	1899
	Wallace Canfield, *C*., ...	East Canaan, ...	1899
	Abel G. Stevens, ...	"	1900
	Robert D. Perin, ...	Canaan, ...	1900
	Samuel A Eddy, *S*., *A. V*, ..	"	1901
	E. S. Roberts, *A. V*.,.. ..	East Canaan, ...	1901

* Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
North Haven,	Dr. R. B. Goodyear, *S.*, *A. V.*,	North Haven,	1899
	John A. Tomlinson,	" "	1899
	Hubert F. Potter, *C.*,	Montowese,	1899
	Charles O. Saxton,	"	1900
	Jesse B. Jacobs,	North Haven,	1900
	Julian W. Tuttle,	" "	1900
	George J. Merz,	" "	1901
	Frank Foote,	Montowese,	1901
	Isaac E. Mansfield,	North Haven,	1901
North Stonington,	John B. Perry, *C.*,	Clark's Falls,	1900
	Mrs. Chester S. Maine, *A. V.*,	North Stonington,	1900
	Mrs. John D. Avery, *S.*,	"	1900
Norwalk,	Charles W. Bell,	Rowayton,	1899
	Frederick R. Mead,	Norwalk,	1899
	Bradley S. Keith, *C.*,	"	1899
	John H. Light, *A. V.*,	South Norwalk,	1900
	James W. Storey,	Norwalk,	1900
	Charles Olmstead, *S.*, *A. V.*,	"	1900
	Frank A. Ferris,	South Norwalk,	1901
	Abiathar Blanchard, *A. V.*,	"	1901
	Marshall H. Tolles,	"	1901
Norwich,	Dr. Geo. Thompson,	Taftville,	1899
	T. A. Perkins,	Greeneville,	1899
	Charles W. Bradbury,	"	1899
	Alfred Edmundson,	Taftville,	1900
	Charles N. Congdon,	Yantic,	1900
	Albert W. Lillibridge,	Norwich Town,	1900
	H. W. Hale,	Norwich Town,	1901
	Frank T. Maples, *S.*, *A. V.*,	Norwich,	1901
	Franklin H. Brown, *C.*,	Norwich,	1901
Norwich (Town St. Dist),†	Lewis A. Hyde,	Norwich,	1899
	John A. Brady,	Norwich Town,	1899
	Joel Foster,	"	1899
	A. W. Dickey,	" "	1900
	William H. Fitch,	" "	1900
	James H. Welles,	" "	1900
	Dr. Wm. S. Palmer, *C.*, *A. V.*,	" "	1901
	Miss M. P. Gilman, *A. V.*,	" "	1901
	Miss Georgia A. Case, *S.*,	" "	1901
Norwich (Central Dist.),†	J. Eldred Brown,	Norwich,	1899
	Edwin A. Tracy,	"	1899
	Gardiner Greene,	"	1899
	Jonathan Trumbull, *C.*,	"	1900
	Cornelius W. Morrow,	"	1900
	Charles B. Chapman,	"	1900
	Dr. Patrick Cassidy,	"	1901
	Frank J. Leavens,	"	1901
	Charles F. Thayer,	"	1901
	N. L. Bishop, *S.* and *Supt.*,	"	....
Norwich (West Chelsea† District),	Sanford A. Chapman,	Norwich, 21 Fairmount st.,	1899
	Wm. R. Cowan, Jr., *S.*,	" 49 "	1899
	Henry G. Peck,	" 11 Peck st.,	1899
	L. P. Church,	" 44 Coit st.,	1900
	C. A. Sherman,	" 6 Nelson place,	1900
	W. W. Ives, *C.*,	" 11 Champlin st.,	1900
	R. W. Tilden,	" 54 Asylum st.,	1901
	James C. E. Leach,	" 62 Summit st.,	1901
	Robert Stevens,	" 162 W. Thames st.	1901
	John B Stanton, *Supt.*,	"	....
Norwich (Falls District),†	Frank H. Pullen, *A. V.*,	Norwich,	1899
	J hn McIntyre,	"	1899
	N. A Bingham,	"	1899
	George D. Lewis,	"	1899
	Frank H. Allen, *A. V.*,	"	1900
	Marcellus Gould, *C.*,	"	1900
	C. Leslie Hopkins, *S.*,	"	1901
Old Lyme, *,	N. L. Sheffield,	Blackhall,	1899
	C L. Peck,	"	1899
	S. L. Waite,	South Lyme,	1899
	R. W. Chadwick, *C.*,	Blackhall,	1900
	J. H. Noble, *S.*,	Lyme,	1900
	A. Henry Griswold, *A. V.*,	Blackhall,	1900
	Wm. P. Howard,	"	1901

* Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
Old Lyme,*	G. R. Swaney,	Blackhall,	1901
	T. B. Farwell,	Lyme,	1901
Old Saybrook,*	Joseph L. Hayden,	Saybrook,	1899
	Robt. Chapman,	"	1899
	Robert Burns,	"	1899
	Frank J. Kirtland,	"	1900
	Dan A. Kellogg,	"	1900
	Rev. J. D. S. Pardee, *S., A. V.,*	"	1900
	Franklin T. Bradley, *C.,*	"	1901
	George W. Denison,	"	1901
	Charles H. Gates,	"	1901
Orange,	Rev. N. J. Squires, *C., A. V.,*	West Haven,	1899
	W. T. Sheehan, *A. V.,*	"	1899
	I. P. Treat, *A. V.,*	Orange,	1900
	D. A. Kimberly, *A. V.,*	West Haven,	1900
	Dr. J. F. Barnett, *S., A. V.,*	"	1901
	John Macrille, *A. V.,*	"	1901
Oxford,	Orlando C. Osborn, *C., A. V.,*	Oxford,	1899
	Dr. Lewis Barnes, *S., A. V.*	"	1899
	Charles H. Lum, *A. V.,*	Stevenson,	1899
	Rev. Grant L. Schaffer, *A. V.,*	Oxford,	1899
	Edgar B. Harger, *A. V.,*	"	1899
	Elijah B. Treat, *A. V.,*	"	1899
Plainfield,	Rev. S. H. Fellows, *S., A. V.,*	Wauregan,	1899
	J. M. Wilcox,	Central Village,	1899
	J. J. Kelley,	Moosup,	1899
	Rev. S. W. Delzell, *A. V.,*	"	1899
	Rev. Henry T. Arnold, *A. V.,*	Plainfield,	1899
	Rev. J. H. Broderick,	Moosup,	1899
	Frederick T. Johnson,	Wauregan,	1899
	Waldo Tillinghast, *C., A. V.,*	Plainfield,	1899
	Erastus Spaulding,	Moosup,	1899
Plainville,*	Mrs. M. P. Ryder,	Plainville,	1899
	J. S. Corban, *S.,*	"	1899
	Edward A. Freeman,	"	1900
	Miss Minnie L. Pierce, *A. V.,*	"	1900
	Robert C. Usher, *C.,*	"	1901
	Rev. H. T. Walsh, *A. V.,*	"	1901
Plymouth,	R. J. Plumb,	Terryville,	1899
	T. F. Higgins,	"	1899
	A. S. Gaylord, *S., A. V.,*	"	1899
	F. A. Scott,	Pequabuck,	1899
	Rev. William A. Gay,	Terryville,	1899
	Ard Welton.	Plymouth,	1899
	Walter E. Mallony,	"	1899
	Henry E. Stoughton,	"	1899
	Wm. W. Clemence, *C.,*	Terryville,	1899
Pomfret,	Rev. Winthrop B. Greene, *A. V.,*	Pomfret Center,	1899
	George N. Allen,	Abington,	1899
	Mrs. Mary I. Smith,	Pomfret Center,	1899
	Mrs. Elizabeth Grosvenor,	" "	1900
	Mrs. Rose Williams,	Abington,	1900
	T. O. Elliott, *C.,*	Elliott,	1900
	Edward Swain,	Pomfret Center,	1901
	Fred Lyon,	" "	1901
	Miss A. C. Averill, *S.,*	" "	1901
Portland,	F. Gildersleeve,	Gildersleeve,	1899
	Dr. C. A. Sears. *C., A. V.,*	Portland,	1899
	Wm. D. Penfield, *S., A. V.,*	Cobalt,	1899
	Richard H. Pascall,	Portland,	1899
	George G. McLean,	"	1899
	Dr. Frank Potter,	"	1899
	Rev. O. H. Raftery,	"	1899
	Rev. W. W. Smith, *A. V.,*	Gildersleeve,	1899
	Ernest L. Lundberg,	Portland,	1899
Preston,	John E. Woodard, *C., A. V.,*	Norwich,	1899
	George V. Shedd, *A. V.,*	Preston City,	1899
	Allen B. Burdick, *S., A. V.,*	" "	1899
Prospect,*	Halsey S. Clark, *C., A. V.,*	Union City,	1899
	George L Talmadge,	Prospect,	1899
	Rev. Wm. H. Phipps, *S., A. V.,*	"	1900
	D. B. Hotchkiss,	"	1900
	D. M. Plumb,	"	1901
	Edgar G. Wallace,	West Cheshire,	1901

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Putnam,*	Dr. John B. Kent,	Putnam,	1899
	Wm. R. Barber, *A. V.*,	"	1899
	Eric H. Johnson, *A. V.*,	"	1899
	George A Hammond, *C.*,	"	1900
	Charles W. Bradway, *S.*,	"	1900
	Dr. Omer La Rue,	"	1900
	E. G. Wright,	"	1901
	J. J. Russell,	"	1901
	F A. Morrell,	"	1901
Redding,	Dr. Howard P. Mansfield,	Georgetown,	1899
	Ebenezer Hill,	West Redding,	1899
	Mrs. C. C. Gorham, *S.*,	Redding,	1899
	J. N. Nickerson,	"	1900
	J. F. Olmstead,	West Redding,	1900
	Wm. A. Lounsbury,	Redding,	1900
	Edward P. Shaw, *A. V.*,	Redding Ridge,	1901
	Rev. U. O. Mohr, *A. V.*,	Georgetown,	1901
	W. C. Sanford, *C.*, *A.V.*,	Redding Ridge,	1901
Ridgefield,	Samuel Keeler,	Ridgefield,	1899
	Rev. Foster Ely, *S.*,	"	1899
	Rev Edw. S. Sanborn,	Ridgebury,	1899
	Joel L. Rockwell, *A. V.*,	Ridgefield,	1900
	Edward H. Smith, *C.*,	"	1900
	Rev. Richard E. Shortell,	"	1900
	Edward J. Couch,	"	1901
	John D. Nash,	"	1901
	John P. Mills,	"	1901
Rocky Hill,*	Mrs. Adelaide W. Wright,	Rocky Hill,	1899
	Frank A. Grant,	"	1899
	Frank E. Holmes,	"	1899
	Frank E. Sherwood, *S.*,	"	1900
	Samuel Ashwell, *C.*,	"	1900
	Luther B. Williams,	"	1900
	Frederick Morton,	"	1901
	Charles A. Fowler,	"	1901
	Dr. F. L. Burr, *A.V.*,	"	1901
Roxbury,	Henry S. Hurlbut, *C.*. *A.V.*,	Roxbury,	1899
	E. W. Seeley, *S.*, *A. V.*,	"	1899
	Chas. W. Hodge, *A. V.*,	Roxbury Station,	1900
	Mrs. Chas. Sanford, *A. V.*,	Roxbury,	1900
	Rev. W. D. Humphrey, *A. V.*,	"	1901
	G. W. P. Leavenworth, *A.V.*,	Hotchkissville,	1901
Salem,	Henry E. Avery,	Gardner Lake,	1899
	Alvah Morgan, *C.*,	Salem,	1899
	Rev. J. Ordway,	"	1900
	Robert A. Bailey,	"	1900
	J Raymond Douglass,	"	1901
	Charles B. Harvey, *S.*, *A.V.*,	"	1901
Salisbury,	George B. Burrall, *C.*, *A.V.*,	Lakeville,	1899
	Rev. Timothy F. Bannon,	"	1899
	Rev. Huber G. Buehler, *A. V.*,	"	1900
	Rev. James H. George, *A. V.*,	Salisbury,	1900
	Rev. H. E. Tarrant, *A. V.*,	Lime Rock,	1901
	Elias F. Sanford, *S.*, *A.V.*,	Ore Hill,	1901
Saybrook,*	Thomas L. Parker, *C.*, *A.V.*,	Deep River,	1899
	Emery C. Parker,	"	1899
	Horace P. Denison,	"	1899
	T. L. Harris,	"	1900
	Charles R. Marvin, *A. V.*,	"	1900
	Charlton M. Pratt,	"	1900
	Fred. L'Hommedieu,	"	1901
	Henry M. Snell,	"	1901
	Harvey J. Brooks, *S.*,	"	1901
Scotland,*	John D. Moffit, *C.*,	Scotland,	1899
	Caleb Anthony,	"	1899
	Chas. Pendleton,	"	1900
	John L. Bass,	"	1900
	Gerald Waldo, *S.*, *A. V.*,	"	1901
	Elwin B. Inman,	"	1901
Seymour,*	T. L. James, *A. V.*,	Seymour,	1899
	F. A. Rugg,	"	1899
	Wolfgang Schaffer, *A. V.*,	"	1899
	H. S. Halligan,	"	1900

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Seymour,*	John Early,	Seymour,	1900
	W. H. H. Wooster,	"	1900
	James Swan, *C.*,	"	1901
	L. A. Camp, *S.*,	"	1901
	Dr. Patrick F. Strapp,	"	1901
Sharon,	Herman C. Rowley, *C.*,	Sharon,	1899
	F. W. Dakin,	"	1899
	Frank Northrup,	"	1900
	Chas. C. Dean,	Ellsworth,	1900
	Dwight N. Eggleston,	Sharon,	1901
	Charles C. Gordon,	"	1901
	Dr. C. W. Bassett, *S.*, *A. V.*,	"	....
Sherman,	Mills Hungerford, *A. V.*,	Sherman,	1899
	W. C. Allen,	"	1899
	Daniel B. Mallory,	"	1899
	Dr. John N. Woodruff, *S.*, *A. V.*,	"	1900
	Nelson T. Hungerford,	"	1900
	Charles A. Mallory,	"	1900
	Frank Hungerford, *C.*, *A. V.*,	"	1901
	Ammi D. Giddings,	"	1901
	Wesley J. Soule,	"	1901
Simsbury,*	S. T. Stockwell, *C.*,	West Simsbury,	1899
	J. C. Eddy,	Simsbury,	1899
	C. H. Eno,	"	1899
	J. R. Whitehead,	"	1899
	J. H. Vining,	"	1900
	A. Mitchelson,	Tariffville,	1900
	J. B. McLean, *S.*, *A. V.*,	Simsbury,	1900
	T. J. Clark,	"	1900
	J. L. Bartlett,	"	1901
	E. H. Brockett,	Avon,	1901
	Gavett B. Holcomb,	Simsbury,	1901
	Wm. C. Mather,	Weatogue,	1901
Somers,*	A. F. Kibbe,	Kibbe,	1899
	C. J. Stephenson,	Somers,	1899
	W. P. Fuller, *C.*,	"	1900
	A. G. Chapin,	E. Longmeadow, Mass.,	1900
	F. L. Griswold,	Somersville,	1901
	A. W. Kibbe, *S.*, *A. V.*,	Somers,	1901
Southbury,	Rev. David F. Pierce, *C.*, *A. V.*,	South Britain,	1901
	Henry M. Canfield,	" "	1901
	G. A. Stiles, *S.*,	Southbury,	1901
Southington,*	Norman A. Barnes, *C*, *A. V.*,	Southington,	1899
	Ellen T. Lewis, *S.*, *A. V.*,	Plantsville,	1899
	Lydia E. Sloper, *A. V.*,	Southington,	1899
	Sherman F. Guernsey, *A. V.*,	"	1900
	Henry J. Merriman, *A. V.*,	Plantsville,	1900
	Lucretia A. Cummings, *A. V.*,	"	1900
	Dr. Edwin N. Walkley, *A. V.*,	Southington,	1901
	William H. Cushing, *A. V.*,	"	1901
	Luman Andrews, *A. V.*,	"	1901
South Windsor,	Rev. L. B. Curtis, *A. V.*,	South Windsor,	1899
	C. E Alexander, *S.*,	Vinton's Mills,	1899
	Seth Vinton, *C.*,	Buckland,	1900
	Roswell Grant,	East Windsor Hill,	1900
	Miss Ellen M. Foster, *A. V.*,	Manchester,	1901
	C. M. Johnson,	Wapping,	1901
Sprague,	Nathan Geer,	Baltic,	1899
	H. H. Maynard,	"	1899
	James E. Vickridge, *S.*, *A. V.*,	Hanover,	1899
	Ebenezer Allen, *C.*,	"	1900
	Mrs. Lucinda M. Smith,	"	1900
	Mrs. M. Tarbox,	"	1901
Stafford,	Ralph Wiers, *A. V.*,	Crystal Lake,	1899
	J. R. Washburn, *S.*, *A. V.*,	West Stafford,	1899
	W. H. Black, *C.*, *A. V.*,	Stafford,	1900
	J. M. Larned, *A. V.*,	Stafford Springs,	1900
	Wm. H. Corbin, *A. V.*,	" "	1901
	E. L. Burr, *A. V.*,	" "	1901
Stamford,*	George H Soule,	Stamford,	1899
	Dr. Francis J. Rogers,	"	1899
	Charles H. Peck,	"	1899

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Stamford,*	Schuyler Merritt, *C.*	Stamford,	1900
	Nath'l R. Hart,	"	1900
	H. Stanley Finch,	"	1900
	Frank H. Baldwin,	"	1901
	Dr. Watson E. Rice,	"	1901
	Robert A. Fosdick, *S.*,	"	1901
	Everett C. Willard, *Supt.*,	"	....
Sterling,	A. A. Stanton, *C.*,	Ekonk,	1899
	Oliver A. Barr,	Oneco,	1899
	Orren W. Bates,	"	1899
	Lewis S. Hull,	"	1899
	Rev. Justus Aldrich, *S.*, *A. V.*,	Sterling Hill,	1899
	Gilbert C. Brown,	North Sterling,	1899
Stonington,	Chas. H. Babcock, *C.*, *A. V.*,	Westerly, R. I.,	1899
	Rev. O. D Sherman, *S.*, *A. V.*,	Mystic,	1899
	Silas B. Wheeler, *A. V.*,	Old Mystic,	1899
Stratford,*	A. L. Judd, *A. V.*,	Stratford,	1899
	Chas. H. Wells, *A. V.*,	"	1899
	H. J. Curtis, *A. V.*,	"	1900
	John D. Wells, *S.*, *A. V.*,	"	1900
	Dr. Wm. B. Cogswell, *C.*, *A. V.*,	"	1901
	Albert Wilcoxson, *A. V.*,	"	1901
Suffield,*	Judah Phelps,	West Suffield,	1899
	Dr. Philo W. Street,	Suffield,	1899
	George L. Warner.	West Suffield,	1899
	Edward A. Fuller, *C.*,	Suffield,	1900
	Dr Wm. E. Caldwell,	West Suffield,	1900
	Leverett N. Austin, *S.*,	Suffield,	1900
	Clinton Spencer, *A. V.*,	"	1901
	Howard A. Henshaw,	Mapleton,	1901
	James O. Haskins,	Suffield,	1901
Thomaston,*	Rev. A. T. Parsons, *C.*, *A. V.*,	Thomaston,	1899
	Chas. T. Higginbotham,	"	1899
	Frank H. Hotchkiss,	"	1899
	Rev. M. J. Daly,	"	1900
	Geo. A. Lemmon,	"	1900
	Fred I. Roberts, *S.*,	"	1900
	Geo. A. Stoughton, *A. V.*,	"	1901
	Dr. Ralph S. Goodwin,	"	1901
	James Green,	"	1901
Thompson,*	Rev. G. A. Cummings, *A. V.*,	Thompson,	1899
	Asa M. Ross,	"	1899
	Rev. Samuel Thatcher, *A. V.*,	"	1900
	Stephen Ballard,	"	1900
	E. Herbert Corttis, *C.*, *A. V.*,	North Grosvenordale,	1901
	E. F. Thompson, *S.*,	" "	1901
Tolland,	William D. Holman,	West Willington,	1899
	Geo. P. Field, *C.*,	Rockville,	1899
	W. N. Simmons,	Tolland,	1899
	Fred'k S. Meacham, *S.*, *A. V.*,	Rockville,	1899
	Edward E. Fuller,	Tolland,	1899
	Harry A. Doyle,	"	1899
Torrington,*	Burr Lyon,	Torrington,	1899
	Giles H. Gaylord,	"	1899
	Rev. J B. Brennan,	"	1899
	John Workman,	"	1900
	W. W. Bierce, *S.*,	"	1900
	Louis Eitel,	"	1900
	James Alldis,	"	1901
	Elisha J. Steele, *C.*,	"	1901
	Edward S. Miner,	Burrville,	1901
	Edwin H. Forbes, *Supt.*,	Torrington,	....
Trumbull,*	Ormel Hall, *S.*, *A. V.*,	Plattsville,	1899
	Lewis Brinsmade,	Trumbull,	1899
	Horace L. Fairchild,	Nichols,	1899
	F. S. Shelton,	Long Hill,	1900
	Lorenzo W. Mallett,	"	1900
	Erwin S. Fairchild,	Nichols,	1900
	Eli P. Burton,	Trumbull,	1901
	Sterling H. Booth, *C.*,	"	1901
	Peter Gabler,	Long Hill,	1901
Union,	Henry B. Booth,	Staffordville,	1899
	R. E. Webster, *C.*,	Stafford Springs,	1899

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Union,	Elam C. Booth,	Stafford Springs,	1900
	George Towne, *S.*, *A. V.*,	Union,	1900
	H. G. Barber, *A. V.*,	"	1901
	L. B. Booth,	Staffordville,	1901
Vernon,	Dr. F. Walsh,	Rockville,	1899
	E. G. Butler, *A. V.*,	"	1899
	W. B. Foster, *S.*, *A. V.*,	"	1900
	A. M. Gibson,	"	1900
	A. R Goodrich, *C.*,	Vernon,	1901
	Morris H. Talcott,	Talcottville,	1901
Voluntown,	Leonard B Kinne,	Voluntown,	1899
	Joseph C. Tanner,	Campbell's Mills,	1899
	Birdsey G. Palmer, *S.*, *A. V.*,	Pendleton Hill,	1900
	E. Byron Gallup,	Ekonk,	1900
	William P. White, *C.*,	Pendleton Hill,	1901
	Elmer E. Coon,	" "	1901
Wallingford,	John Walter Mix,	Yalesville,	1899
	J. B. Kendrick,	Wallingford,	1899
	Rev. J. E. Wildman, *S.*, *A. V.*,	"	1900
	Charles B. Yale, *C.*,	"	1900
	L. M. Hubbard,	"	1901
	Dr. Wm. P. Wilson,	"	1901
Warren,	Noble B. Strong, *C.*, *S.*, *A. V.*,	Warren,	1899
	Daniel A. Young,	"	1899
	Samuel E. Tanner,	New Preston,	1900
	William Forestelle,	Warren,	1900
	Homer S. Sackett,	"	1901
	Joseph C. Breen,	"	1901
Washington,*	Orestes Hickox, *C.*,	Washington,	1899
	Elnathan Mitchell, *A. V.*,	"	1899
	Chas. P. Lyman,	New Preston,	1900
	Walter Burnham, *A. V.*,	"	1900
	George T. Sperry, *A. V.*,	Marbledale,	1901
	Wm. G. Brinsmade, *S.*, *A. V.*,	Washington,	1901
Waterbury,	W. F. Griggs, *A. V.*,	Waterbury,	1899
	F. F. Cook, *S.*,	"	1899
	William Thomas,	"	1899
	John A. Osborn, *A. V.*,	"	1900
	Thomas B. Walker,	"	1900
	James Russell,	"	1900
	Homer F. Bassett, *C.*,	"	1901
	Frank P. Brett,	"	1901
	Edward L. Seerey,	"	1901
Waterbury (Cent. Dist.),†	Dr. A. A. Crane, *C.*, *A. V.*,	Waterbury, 300 W. Main	1900
	Geo. H. Cowell, *A. V.*,	" 58 Park pl.,	1900
	Dr. J. D. Freney, *A. V.*,	" 337 E. Main,	1900
	Dr. Thomas J. Kilmartin, *A. V.*,	" 473 W. Main	1900
	Dr. Charles Rodman,	" 101 N. Main,	1900
	Dr. Geo. W. Russell, *A. V.*,	" 2 N. River S.	1900
	Eugene A. Pendleton, *A. V.*,	" 41 Johnson,	1900
	B. W. Tinker, *Supt*,	"	....
	T. J. Moran, *Secretary*,	"	....
Waterford,	A. H. Lanphere, *C.*, *A. V.*,	Waterford,	1899
	H. H. Gorton, *S.*, *A. V.*,	New London,	1899
	R. B. Wall, *A. V.*,	Waterford,	1899
	F. P. Robertson, *A. V.*,	Quaker Hill,	1899
	E. J Hempstead, *A. V.*,	New London,	1899
	S. B. Manwaring, *A. V.*,	Waterford,	1899
Watertown,	Horace D. Taft, *C.*, *A. V.*,	Watertown,	1899
	Mrs. Ida M. T. Pegrum, *A. V.*,	"	1899
	T. P. Baldwin, *S.*, *A. V.*,	"	1900
	Chas. W. Bidwell, *A. V.*,	"	1900
	E. C. Margraff, *A. V.*,	"	1900
	Edward P. McGowen, *A. V.*,	"	1900
Westbrook *,	Chas. L. Clark, *C.*,	Westbrook,	1899
	Gilbert A. Post,	"	1899
	Carlos H. Chapman, *S.*, *A. V.*,	"	1899
	Albert W. Stokes,	"	1900
	Horace E. Kelsey,	"	1900
	Morris B. Crofut,	"	1900
	Henry W. Wright,	Ivoryton,	1901

*Town School Committee. † Board of Education.

Towns.	Names.	P. O. Address.	Term Expires.
Westbrook,*	John A. Walker, *A. V.*,	Westbrook,	1901
	Chas. E. Chapman,	"	1901
West Hartford,*	H. C. Judd, *C.*,	Hartford,	1899
	C. Edward Beach,	West Hartford,	1899
	A. Carl Sternberg, Jr.,	" "	1899
	W. S. Lines,	Hartford,	1900
	Leonard D. Fiske,	"	1900
	George W. Staples,	West Hartford,	1900
	Mrs. Kate F. Way,	" "	1901
	Wm. H. Hall, *Supt*,,	" "	1901
	Wm. W. Huntington, *S.*,	Hartford,	1901
Weston,	Vanderbilt Godfrey, *C.*,	Weston,	1899
	Ebenezer Fitch,	"	1899
	Chas. R. Morehouse,	"	1900
	Walter P. Rowland, *S.*, *A. V.*,	"	1901
	Iverson C. Fanton,	Aspetuck,	1901
Westport,	Rev. Jabez Backus, *A. V.*,	Westport,	1899
	John H. McArdle,	"	1899
	Dr. L. T. Day, *S.*,	"	1900
	J. Frank Ellwood,	Green's Farms,	1900
	Wm. H. Saxton, *C.*, *A. V.*,	Saugatuck,	1901
Wethersfield,	C. Eugene Adams,	Wethersfield,	1899
	Thomas N. Griswold, *C.*,	South Wethersfield,	1899
	Stephen Morgan,	Wethersfield,	1899
	Rev. Herman Lilienthal,	"	1900
	Frederick A. Griswold,	"	1900
	Luther W. Adams,	South Wethersfield,	1900
	Leslie E. Adams, *S*, *A. V.*,	" "	1901
	Edward D. Robbins,	Wethersfield,	1901
	Frederick W. Warner,	"	1901
Willington,	Charles H. Hobby, *C.*, *A. V.*,	Mansfield,	1900
	Charles H. Brown, *S.*, *A. V.*,	Willington,	1900
	L. W. Holt, *A. V.*,	East Willington,	1900
Wilton,	Horace S. Reynolds, *A. V.*,	North Wilton,	1899
	Percy S. Ackerman, *S.*,	Wilton,	1899
	George F. Brown,	Cannon's,	1900
	John Burr Sturges,	"	1900
	Richard H. Fitch,	Wilton,	1901
	Strong Comstock, *C.*,	North Wilton,	1901
Winchester,	James P. Shelley, *C.*, *A. V.*,	Winsted,	1899
	Miss B. W. Carpenter, *A. V.*,	Winsted, Station A,	1899
	J. H. Van Kuren, *A. V.*,	"	1900
	Charles A. Bristol, *S.*, *A. V.*,	" Station B,	1900
	Dr. William S. Hurlbert, *A. V.*,	"	1901
	Mrs. M. W. Wetmore, *A. V.*,	Winchester,	1901
Windham,*	Dr. John Weldon,	Willimantic,	1899
	James W. Hillhouse,	"	1899
	George T. Spafford,	North Windham,	1899
	Mrs. Emir W. Hamlin, *A. V.*,	Willimantic,	1900
	Samuel B. Harvey,	"	1900
	Dr. Frank E. Guild,	Windham Center,	1900
	Frank M. Wilson, *C.*,	Willimantic,	1901
	George E. Hinman, *S.*,	"	1901
	Theodore Potvin,	"	1901
Windsor,	M. T. Kennelly,	Poquonock,	1899
	Rev. Roscoe Nelson, *C.*, *A. V.*,	Windsor,	1899
	R. Arthur Hagarty, *A. V.*,	Poquonock,	1900
	Dr. J. N. Dickson, *S.*, *A. V.*,	"	1900
	Geo. R. Maude, *A. V.*,	Windsor,	1901
	William H. Harvey, *A. V.*,	"	1901
Windsor Locks,*	Geo. M. Montgomery, *A. V.*,	Windsor Locks,	1899
	Thos. Hancock,	"	1899
	T. F. McCarty, *C.*,	"	1900
	C. F. Cleveland,	"	1900
	Dr. W. J. Coyle, *A. V.*,	"	1901
	F. L. Ashley, *S.*,	"	1901
Wolcott,*	Frederic M. Upson,	Wolcott,	1899
	Andrew J. Slater,	"	1899
	Samuel Wilson,	"	1900
	Henry B. Carter, *C.*,	"	1900
	Evelyn M. Upson,	Wolcott,	1901
	Carroll Norton,	"	1901
	Rev. F. P. Waters, *A. V.*,	"	....

*Town School Committee.

Towns.	Names.	P. O. Address.	Term Expires.
Woodbridge,*	Stiles C. Williams,	Westville,	1899
	Henry E. Baldwin,	"	1899
	Charles Pierson Augur, *C.*,	"	1899
	William W. Peck,	"	1900
	Stephen M. Peck,	"	1900
	Warren F Hotchkiss.	"	1900
	William H. Warner, *S.*, *A. V.*,	"	1901
	Albert L. Sperry,	"	1901
	Phineas E. Peck,	"	1901
Woodbury,*	Edward S. Boyd,	Woodbury,	1899
	Mrs. N. M. Strong,	North Woodbury,	1899
	Rev. Joseph A. Freeman,	Woodbury,	1900
	W. J. Clark, *S.*,	North Woodbury,	1900
	Rev. J. L. R. Wyckoff,	"	1901
	Michael F. Skelly, *C.*,	Woodbury,	1901
	Rev. R. B. Reynolds, *A. V.*,	North Woodbury,	....
Woodstock,	Rev. F. H. Viets, *C.*,	East Woodstock,	1899
	Rev. P. S. Butler, *A. V.*,	West Woodstock,	1899
	Wayland Gage,	" "	1899
	Henry K. Safford,	" "	1899
	Vernon T. Wetherell, *A. V.*,	East Woodstock,	1899
	Henry W. Hibbard, *A. V.*,	Woodstock,	1899
	Dr. Joseph Spalding,	"	1899
	W. W. Webber, *S.*,	"	1899
	Mrs. F. A. Corbin,	"	1899

* Town School Committee.

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ANNUAL REPORT

OF THE

HIGHWAY COMMISSIONER

OF THE

STATE OF CONNECTICUT,

TO THE

GOVERNOR,

For the Year Ending December 31, 1897.

PRINTED BY ORDER OF THE LEGISLATURE.

NORWICH:
THE BULLETIN CO., 85 MAIN STREET.
1898.

STATE OF CONNECTICUT,
HIGHWAY COMMISSIONER'S OFFICE,
HARTFORD.

To His Excellency, LORRIN A. COOKE,
Governor of the State of Connecticut.

Sir:—In conformity with the provision of the law, I have the honor to present the Third Annual Report of this department, covering a period of six months, from July 1, to December 31, 1897.

Very respectfully yours,
JAMES H. MACDONALD,
Highway Commissioner.

THIRD ANNUAL REPORT.

HAVING familiarized myself with the new law, I remember sitting down at my desk the day I became Commissioner of State Highways, and writing in my journal this sentence:—"I wonder how this new law will work." I presume the reason of this remark or question was my personal experience with the workings of the old law, and with all the natural opposition which the Commissioners had to contend with. Old customs in road building carry with them many well-established, closely followed methods which existed years and years ago, as deep rooted as the rocks of Gibraltar, and the old sovereignty of the towns, still strong, that did not brook interference, although such interference might bring them better and more economical methods of road construction, and also financial assistance. A new law, with which the people were unfamiliar; road contractors fighting every inch of the way to retain the old system of "so-much a mile," to improve the roads, the majority of which

went into the pockets of the road contractors, and very little into the roads. Jealousies to have the road to be improved in front of every man's house who resided in the town; 15,000 miles of roads, the majority of which needed improvement; over 5,000 miles of these, main roads, all of which needed more or less treatment; large bonded indebtedness, small grand lists, large taxes to pay, farmers overworked and poorly paid, still fighting on heroically, desiring better things, with seemingly no means at hand to accomplish the desire of their hearts. Poor towns with small grand lists, practically shut out by more favored sister towns with larger grand lists and better financial conditions. The Commissioner knew of these discouragements, having been a member of the old Commission where he was confronted by them in his work every day.

In addition to these circumstances, owing to new methods of road construction, of which some of the Selectmen, as well as many of the contractors were ignorant, the three Commissioners found they were physically unable to properly give the work that attention, both educational and otherwise, that it demanded. It was not strange, then, that, standing on the threshold of a new year, and knowing all the conditions that I have named, and with a new bill, that I should write as I did.

That this report may take its proper place, as the Third Annual Report of the Highway Commissioner, and that there shall not be a missing link of six months, I would most respectfully say that the work of the former Board of Highway Commissioners, during the six months intervening between December and July, consisted in finishing up quite a number of roads that had been unfinished when the season of 1896 closed.

HIGHWAY IMPROVEMENTS—

The following table gives general information regarding the ished and accepted during

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Berlin.....	Geo. H. Sage.....	telford	14 0	8 0	13	1.13	.....
Griswold.....	R. A. Woodbury & Co.	macadam	16 0	8 0	7	1.10	.....
Middlefield.....	A. Brazos & Sons.....	macadam telford	16 0	6 0	7 13	.75 1.50	.....
New Britain...	Williard W. Ballou....	telford	14 0	8 0	13	1.25	.....
North Branford.	C. R. Waterhouse, Jr. Sam'l D. Maltby & Co.	macadam macadam	16 0 16 0	12 0 8 0	7 7	1.30 1.25	....
New Canaan...	Henry D. Taylor.....	macadam	18 0	4 0	7	1.20	.....
Putnam.....	R. A. Woodbury & Co.	macadam	22 0	6 0	7	1.96	.....
Plymouth.....	John A. Doolittle & Co	macadam	16 0	6 0	7	.98	.....
Thomaston.....	C. B. Cadwell.....	macadam	36 0	2 0	7	2.40	.....
Woodbridge....	Frank Brault.....	gravel	14 0	11 0	14	1.25	.....
Voluntown ...	John A. Doolittle & Co.	macadam	16 0	14 0	7	1.00	.....
Wilton.... ...	L. Brondel*..... ... Ebenezer Coley*.....	gravel gravel	14 0 14 0	6 0 6 0	 8	.27½ .20	....
Windham.....	H. L. M. Ladd.....	macadam	16 0	6 0	7	1.07	.....

*Contract sublet.

APPROPRIATION OF 1896.

roads contracted for under the appropriation of 1896, but fin-
the last six months of 1897.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
8in.bot course	5 in. course	med.	½ m.	steam	earth / cobble	.....	lin. ft. 2,485.	W. H. Cadwell.
all	.....	heavy	2 m.	steam	earth / cobble	.....	2,540.	Robert Fenton.
all	.... .	light	¼ m.	steam	earth	iron	2,600.	E. P. Auger.
all	.....	med.	½ m.	steam	earth	tile	2,407.2	W. H. Cadwell.
all	.....	light	4 m	horse	earth	... ..	873.	A. B. Hill.
all	.....	heavy	1½ m.	horse	earth	.....	880.	
all	screen-ings	light	2 m.	steam	Town	stone	2,373.6	J. M. Silliman.
.....	all	heavy	1 m.	steam	paved	iron	1,594.	H D. Card.
.....	all	med.	2½ m.	steam	earth	.....	2,820.	Roswell Atkins.
all	screen-ings	heavy	1 m.	steam	earth	.....	2,244.	William G. Smith.
all	.....	heavy	4 m.	horse	earth	.....	1,440.	A. B. Hill.
all	.....	light	1 m.	steam	earth	.....	1,227.	C. E. Chandler.
all	.....	.....	.....	.....	.....	.....	7,614.	J. S. Silliman.
all	.....	light	¾ m.	steam	earth	.....	2,432.	
.....	all	heavy	½ m.	steam	earth	stone	2,663.5	H. D. Card.

THE LAW OF 1897.

Although the Commission had been in existence for two years, and many of the towns were acquainted with all that was necessary to fully equip them with knowledge in regard to what was necessary to be done to make the appropriation available to their town—in consideration of the fact that the old law had been repealed, and a new law was in force—the Commissioner deemed it wise to have a copy of the new law printed, and sent to every town in the State, so that every Selectman might understand what was required under the new law.

At the session of the General Assembly of 1897, the appended bill was passed and concurred in by the Senate, and received the signature of Your Excellency, and, in due time, became a law.

CHAPTER CCXXIX.

AN ACT

TO PROVIDE FOR THE IMPROVEMENT

OF PUBLIC ROADS.

General Assembly,
January Session, A. D. 1897.

Be it enacted by the Senate and the House of Representatives, in General Assembly convened:—

Section 1. There shall be appointed by the Governor, with the advice and consent of the Senate, before the rising of this General Assembly, and biennially thereafter on or before May first of the year in which the General Assembly is in session, a Highway Commissioner, who shall hold office for two years from the first day of July next succeeding his appointment and until his successor is chosen and qualified. If any vacancy occur, the Governor shall appoint a Highway Commissioner to fill such vacancy until the rising of the next succeeding General Assembly.

Sec. 2. The Commissioner shall be a capable and experienced road builder, and shall receive an annual salary of twenty-five hundred dollars, and shall be allowed such sum, not to exceed five hundred dollars, as may be necessary for his actual traveling expenses while officially employed; and shall be allowed his office expenses, not to exceed fifteen hundred dollars, in any one year.

Sec. 3. The Comptroller shall furnish the Commissioner with a suitable office at the Capitol, with the necessary furniture and stationery for the same, where his records shall be preserved, and which office shall be kept open at such times as the business of the Commissioner may require.

Sec. 4. The Commissioner shall keep a record of all proceedings and orders, and copies of all plans, specifications and estimates. An annual report of the doings of the Commissioner shall be prepared and submitted to the General Assembly.

Sec. 5. Whenever any town in this State shall have voted its intention to cause any public road, or section thereof, within such particular town, to be improved, under the provisions of this Act, the Selectmen of such town, with the approval of the Highway Commissioner, shall select the highway, or portion thereof, to be so improved, and shall cause all necessary surveys to be made and specifications to be prepared. The specifications shall require the construction of a macadamized road, or a telford, or other stone road, or other road satisfactory to the Highway Commissioner and the Selectmen of the Town in which the road is to be constructed, that will, at all seasons of the year, be firm, smooth and convenient for travel, shall be so prepared as to call for bids from which an approximate estimate of the cost can be ascertained, and shall state the amount of security that will be required of the bidder. After such specifications shall have been prepared, they shall be submitted to the Highway Commissioner; and, if he shall approve them, it shall then be the duty of the Board of Selectmen to advertise in two daily newspapers having a circulation in the County in which said town is located, for a period of two weeks, for bids to do the work according to the specifications prepared. Such advertisements

shall state the place where the bidders can find the specifications, and the amount of the bond which must accompany a bid, and shall name the place where the Selectmen shall meet to receive the bids, and the time for opening the same. Every such bid shall be accompanied with a bond signed by the bidder and one or more sureties satisfactory to the Selectmen, in such sum, not less than one thousand dollars, as the Selectmen shall determine, conditioned that, if the contract shall be awarded to the bidder, he will, when required by the Selectmen, execute an agreement, in writing, to perform the work according to the specifications. All bids received theretofore shall be immediately and publicly read at the time for opening the same, as stated in said advertisements. The Selectmen may reject all bids, if, in their opinion, good cause exist therefor, but otherwise they shall award the contract to the lowest bidder, who shall give satisfactory evidence of his ability to perform the contract. When the contract is executed by the Selectmen and the successful bidder, a copy of the contract, with the estimated cost of the work, shall be forthwith filed with the Highway Commissioner. Whenever the Selectmen of any town shall desire, in behalf of said town, to do the work of improving a public road under the provisions of this Act, they shall submit their bid to the Highway Commissioner at least one day prior to the day specified for the opening of the other bids, as stated in the advertisement for bids; and all bids submitted in behalf of towns shall be subject to the requirements made and provided for in this Act. No bids in behalf of towns shall be opened by the Highway Commissioner until after the other bids for the same work shall have been publicly opened and read by the Selectmen, as required by this Act, and forwarded to said Commissioner. If the Highway Commissioner shall find, from the bids so submitted, that the bid in behalf of the town is the lowest, the Commissioner shall thereupon award the contract to said town, whereupon the Selectmen shall forthwith file with the Highway Commissioner a statement, setting forth the work to be done, and the estimated cost of the same, and they shall fulfill all the requirements and terms of the specifications, according to the plans for said work under which their bid was submitted.

Sec. 6. Whenever any road shall be constructed under this Act, one-half of the cost of said construction shall be paid for out of the State Treasury; provided, that the whole of the amount so paid by the State shall not, in any one year, exceed the sum of one hundred thousand dollars; and one-half the cost shall be paid for out of the Treasury of the town in which such road is constructed. When a road has been constructed in any town under this Act, such town shall thereafter keep such road in proper repair, to the acceptance of the Highway Commissioner.

Sec. 7. It shall be the duty of the Selectmen of their respective towns, subject to the approval of the Highway Commissioner, to supervise all the work and contracts and the construction of all roads under this Act; they shall require provisions of the contracts and specifications to be strictly adhered to by the contractors, and, immediately after the completion of the contract and before the State appropriation is paid, the Selectmen of such town shall make oath that all the plans have been completed according to the contract. A certificate of the cost of every road constructed under this Act shall be filed with the Highway Commissioner by the Selectmen of the town in which such road shall have been constructed, and the Highway Commissioner shall, between December fifteenth and thirty-first in each year, certify to the Comptroller the amount to be paid to each town for such year, and the Comptroller shall thereupon draw his orders on the Treasurer in favor of the respective towns for the sums certified as aforesaid, and the Treasurer shall pay the same out of any money in the State Treasury.

If the improvements upon any highway shall not be completed before the close of the season in which they were commenced. the Highway Commissioner may order the same to be continued and completed at the beginning of the following season, under the same provisions and conditions as were existing at the close of the preceding season, and when said improvements are completed as ordered, said Highway Commissioner may make such certificates thereto as are required by this Act in other cases, and the cost of making said improvements shall be charged, reckoned, and paid for as though they were completed in the year in which they were commenced.

Sec. 8. No sum exceeding in the aggregate three thousand dollars shall be expended in any one town in any one year under the provisions of this Act.

Sec. 9. The term "public roads" as used in this Act shall be construed to mean and include only the main highways leading from one town to another.

Sec. 10. Chapter CCCXV of the Public Acts of 1895 is hereby repealed.

Sec. 11. This Act shall take effect from its passage.

COMMUNICATIONS.

Accompanying the law, was a circular, a text of which is appended. The law and circular were sent out on June 22d, so as to save time, as the Commissioner fully realized that the time for road-building would be short, and every moment precious.

"Hartford, June 22d, 1897.

"Hon. Board of Selectmen,

"Gentlemen:—You will notice to participate under the Act for making of highways, that you will have to comply with these requirements: 1st—Read the bill carefully: 2d—Call a town meeting under the statutes, stating the purpose for which such a meeting is called, and get the right to appropriate money. You must send to the Highway Commissioner the resolution passed at the meeting. Enclosed you will find a blank form which shall be signed by the Selectmen. Embodied in the resolution, must be a full description of the road to be improved, giving the location, the town and county, and the kind of a road desired; also the distance in feet and miles, naming the point of starting and also where you intend to stop.

"Very respectfully yours,

"JAMES H. MACDONALD.

"Highway Commissioner."

During the hearings which were had at the meetings of the Committee on Roads and Bridges, having the consideration of the new law before them, a misapprehension seemed to exist in the minds of a great many who appeared before the Committee, relative to the attitude of the Commissioners in regard to the kinds of road the towns were allowed to build. Many of those who testified before the Committee expressed the opinion that "the Commission would not allow any road to be built in the State of Connecticut, under the then existing 'Good Roads Law,' except a macadam or telford road." This was clearly a misunderstanding, and, fearing that the misapprehension might still exist in the minds of the Selectmen, and those who might desire to take advantage of the State law for a betterment of their roads, the Commissioner deemed it wise to remove this misunderstanding by the following circular:—

"Hartford, June 26, 1897.

"To the Selectmen,

"Gentlemen:—When you get ready for specifications, I will furnish you a copy for Macadam, Telford, or Gravel, after you have decided the kind of road you desire to build. This will save much valuable time and expense besides insuring a uniformity of construction under approved methods.

"I should like to have every Selectman in the State feel perfectly free to ask me any questions relating to the work or the law, and I will try and make everything as clear and plain as I can. I think there should be a perfect understanding between the Selectmen and the Commissioner, so that we may work harmoniously together, for the common cause of 'Good Roads.' All communications will be courteously received and cheerfully answered.

"Yours respectfully,

"JAMES H. MACDONALD,

"Highway Commissioner."

You will notice the circular leaves the selection of the kind of road to be built entirely in the hands of the town, or of the Selectmen. Having had access by rail and by road, also to in-

formation derived at the numerous town meetings, which the Commissioner attended, of the conditions by which the towns of the State are surrounded, the Commissioner felt that the choice of the kind of road to be built should be left entirely to the towns themselves, so that the intention of the law, as interpreted by the Commissioner, would be carried out, namely, as a help to the town, rather than an injury.

This circular was productive of great good, and a better understanding of the mind and purpose of the Commissioner toward the several towns of the State was gained, and I believe that the course pursued has resulted in not only a better understanding, but a more economical method of construction of the roads of the State has come to pass. No better evidence of this fact can be shown than a glance at the list of the towns that have come in this year, for we find on examination of the list, of the towns who have participated under the Act of 1897, very many of those who were opposed to the old law, have built their roads, and expressed themselves very much pleased with the methods now employed.

Having outlined his policy for the year, the next step taken by the Commissioner was to send out the following circular, stating the final day for receiving applications:—

"Hartford, July 6, 1897.

"Hon. Board of Selectmen,

"Gentlemen:—Owing to the short time we have before the season of road-building will close, we will make July 25th, as the final day for receiving applications from the towns to participate in this year's appropriation.

"If your town intends to take advantage of the law, for improving your roads, it will be necessary for you to file your application on or before July 25th.

"Yours respectfully,

"JAMES H. MACDONALD,

"Highway Commissioner."

Many of the towns having been delayed from various causes to hold town meetings, the Commissioner deemed it wise to

extend the time, and issued the appended circular ; so that every town might feel that they had an opportunity to apply and secure a portion of the State appropriation :—

"Hartford, July 21st, 1897.

"Hon. Board of Selectmen,

"Gentlemen :—By request of several towns the time for receiving applications for State aid is extended to July 31st, 1897.

"JAMES H. MACDONALD,
"Highway Commissioner."

A change having been made relative to inspecting the work, the Commissioner deemed it wise to acquaint the Selectmen with that fact, and with that end in view, sent out the following circular :—

"Hartford, September 7, 1897.

"Board of Selectmen,
"Town of

"Gentlemen :—Please allow me to call your attention to Section 7 of Chapter CCXXIX, and ask you to comply with the law relative to inspection of the work, now under construction in your town; the Section reads: 'It shall be the duty of the Selectmen of their respective towns, subject to the approval of the Highway Commissioner, to supervise all the work and contracts and the construction of all roads under this Act; they shall require provisions of the contracts and specifications to be strictly adhered to by the contractors and immediately after the completion of the contract, and before the State appropriation is paid, the Selectmen of such town shall make oath that all the plans have been completed according to the contract.'

"This section places an obligation on the Selectmen to inspect the work from the commencement of the road until the road is finished and accepted by the Highway Commissioner; this will insure first-class work and also security for the Selectmen in making oath that the work has been done according to plans and specifications. I need not tell you, for I believe that you know that careful and conscientious personal supervision is

essential and necessary to properly build the road now under construction in your town.

"I shall visit the work as frequently as I can, but it will be impossible for me to supervise the work in every town with the attention it demands, as I have 64 towns to look after, so the burden of inspection must of necessity fall on the Selectmen. You can appoint one of your board to look after the work, or the board can appoint an inspector to supervise the work, but whoever has the work to do the inspection should be constant and thorough.

"Very respectfully yours,

"JAMES H. MACDONALD,

"Highway Commissioner."

This circular had a direct effect on the Selectmen of very many of the towns, and they carefully looked after the work while it was in progress, but in many of the towns the work did not have that constant and personal inspection that it required. This was due to some of the Selectmen being inadequately paid to remain on the work constantly, because the compensation received was not sufficient to pay them for their time. I am satisfied that this was very injurious to the work, and I firmly believe that some method or plan should be adopted, whereby all the work under construction in the State of Connecticut should have constant attention from the commencement of the work until its final completion and acceptance.

After the allotments were made and a majority of the towns that had contracted for their work commenced to construct their roads, the Commissioner found that he would have about $10,000, in excess of the money required to pay to the towns for one-half of the cost of the work at that time contracted for. It occurred to the Commissioner by his observation and experience, together with the information he had received during the past three years, that very many of the small towns of the State were financially unable to appropriate a large sum of money for the purpose of macadamizing or telfordizing their roads, but could afford to spend a few hundred dollars profitably in the reduction of some of the heavy grades or in the making of some improvements on

their roads other than macadamizing or telfordizing them. So with a view to ascertaining the mind of these towns, the Commissioner sent the appended circular:—

"Hartford, September 11, 1897.

"Board of Selectmen,

"Town of ———, Conn.

"Gentlemen:—The appropriation of 1897 is not quite used up, and I propose to use the balance for grading purposes and will allow towns who so desire to have a pro-rata share of this money to cut down the hills and fill up the valleys.

"A small amount of money used intelligently will do much good on many of our roads. A 'town meeting will have to be held' and vote 'an amount equal to that allowed by the State.' The amount I have to allot to each town will be determined entirely by the number of towns applying. All applications must be in by October 1st,* 1897.

"Yours respectfully,

"James H. Macdonald,

"Highway Commissioner."

BENEFITS OF GRADE REDUCTION.

The Commissioner was very much gratified to receive a very prompt reply to this circular from 34 towns, a very large number of which availed themselves of the appropriation for the first time since the inauguration of the "Good Roads Laws." The Commissioner is satisfied that this feature of the work is destined to be very helpful and very popular in the towns, and it is his intention to continue the work of assisting these small towns in the matter of reducing their grades and improving their roads through the next year by the same method adopted this year. The Commissioner does not think that sufficient importance has been attached to this question of grade reduction. He firmly believes that the reduction of a grade is one of the most important features of road construction, and that it comes more

*This time was extended by request of the towns to October 15, so that the vote might be taken at the annual town meetings.

nearly to a permanent improvement than any other feature of road construction, as it is an improvement that is there for all time, and gives, perhaps, a larger return for the money invested than any other that can be had from any method of road construction. A road is never any better than its weakest point, no matter how long or how wide or how good it may be, whether the weak point is a hill or a swamp. The Commissioner has seen splendid results, which brought with them, not only greater convenience for traveling, in shortening the distance to be traveled, but also increasing the weight of the load which is to be carried over the road where the hills have been cut down and valleys filled. The town of Middlebury has used the entire appropriation, covering three years, in the reduction of a grade between Middlebury and Naugatuck. This has resulted in accomplishing great good to this town by a reduction of freight rates for coal and other commodities, having to be brought into town, besides all the other benefits which naturally result through a reduction of grades.

The Commissioner having received applications from these towns, immediately made the allotments, which graded from $50.00 to $413.00, as the minimum and maximum amounts, and immediately notified the towns by the following circular, which conveyed, as will be readily seen, some valuable information, and also encouragement to the towns to submit a bid for the work:—

"Hartford, October 17, 1897.

"Board of Selectmen,

"Town of ————.

"Gentlemen:—I have allotted to your town the sum of ———— dollars; an equal amount must be appropriated by your town, which will make ———— dollars, to be used in improving the roads in your town, under Chapter CCXXIX, 'An Act for the Improvement of Public Roads.' This money is to be spent in grading. The law requires the following course to be pursued to have the money available:

"1st—Select a main highway, leading from one town to another.

"2d—Have a survey made.

"3d—Draw up a specification.

"4th—Submit survey and specification to the Highway Commissioner.

"5th—After approval, advertise for bids for two weeks in two daily newspapers circulating in the county.

"6th—Award contract to lowest bidder.

"So as to reduce expenses, a profile will be all that is necessary, showing cut and fill with a cross section of the road.

"I send enclosed copy of advertisement to be inserted in the paper.

"I should very much like to see the towns do their own work, thereby keeping all the money at home, and I see no reason why they cannot so do, as the work does not require any special tools or machinery. The law allows the Selectmen to bid for the work, but requires the bid of the Selectmen to be sent to the Highway Commissioner one day prior to the opening of the bids by the Selectmen. In surveying for the work, you can take as a guide, for the amount of work you can do for the money you have at your disposal, these prices for cubic yard, which I have found prevail this year throughout the State: Minimum prices in sand, 12 cents per cubic yard, 450 feet haul. Average maximum price for mixed dirt, 25 cents per cubic yard, 800 feet haul; rock cutting, $1.00 to $1.25 per cubic yard. As the time is limited, I would suggest having survey made as soon as possible, although it is not required to finish the work this year, the law requires the letting of the contract before December 31st. Any further information you may need will be cheerfully sent.

"Very respectfully yours,

"J. H. MACDONALD,

"Highway Commissioner."

The law allows the Commissioner to duplicate the amount voted by the towns for the improvement of their roads. In the majority of cases, the towns received $413.00, which with a like amount, given by the State, would make available to these towns which had the maximum figure of $413.00, $826.00. This seems

a small amount, and yet it has worked wonders. One town has entered into contract with the contractor to reduce the grade of five hills on five different main roads, for this amount of money. What this means to the traveling public, will be readily understood by all who have occasion to ride over the roads of our State, and needs no further comment.

There are many other towns in the list who came in under the grading apportionment, who will realize equally as much benefit from the money so spent as the town referred to. This can be readily seen by looking at the list of the work in the table which appears later in this report.

TOWNS GRADING—1897.

The following towns are those which applied for an apportionment of the money for grading purposes.

Beacon Falls,
Berlin,
Bethel,
Branford,
Bridgewater,
Canaan,
Chester,
Columbia,
Cornwall,
East Lyme,
Easton,
Goshen,
Haddam,
Harwinton,
Montville,
Monroe,
Morris,
New Milford,
Norfolk,
North Canaan,
North Stonington,
Old Lyme,
Prospect,
Scotland,
Simsbury,
Sterling,
Stratford,
Stonington,
Thomaston,
Washington,
Westbrook,
Westport,
Winchester,
Willington.

Eleven of these towns, failing to comply with the law, did not receive the appropriation. This is to be regretted, for many of these towns delayed getting their plans and specifications made and approved until it was too late to advertise for two

weeks. Several of these towns received no bids for the work, and the town failing to submit a bid for the work themselves, the time having expired on the 31st day of December, and some of them closing their bids on that day, it was impossible to re-advertise, and so the money was lost to the town. Ample time was given all the towns—as the Commissioner had notified these towns, as may be seen by the circulars which were sent out from the Commissioner's office—if they had improved their opportunities as the other towns did that came in and secured the State appropriation.

APPROPRIATION FOR GRADING.

The following tables will show the amount of money appropriated by the State, and also the total amount appropriated by the State in each county for grading purposes:—

HARTFORD COUNTY.

Town.	Appropriated by the State.
Berlin	$413.00
Total	$413.00

NEW HAVEN COUNTY.

Towns.	Appropriated by the State.
Beacon Falls	$413.00
Branford	413.00
Prospect	413.00
Total	$1,239.00

NEW LONDON COUNTY.

Towns.	Appropriated by the State.
East Lyme	$413.00
Stonington	413.00
Total	$826.00

FAIRFIELD COUNTY.

Towns.	Appropriated by the State.
Bethel	$413.00
Easton	413.00
Monroe	300.00
Stratford	413.00
Westport	413.00
Total	$1,952.00

LITCHFIELD COUNTY.

Towns.	Appropriated by the State.
Bridgewater	$300.00
Canaan	413.00
Goshen	413.00
Harwinton	300.00
New Milford	413.00
Norfolk	413.00
North Canaan	413.00
Thomaston	413.00
Washington	413.00
Winchester	413.00
Total	$3,904.00

MIDDLESEX COUNTY.

Towns.	Appropriated by the State.
Chester	$200.00
Westbrook	413.00
Total	$613.00

RECAPITULATION.

Counties.	Appropriated by the State.
Hartford	$ 413.00
New Haven	1,239.00
New London	826.00
Fairfield	1,952.00
Litchfield	3,904.00
Middlesex	613.00
Total	$8,947.00

GRADING—1897—*Continued.*

These tables will show the name of the town in each county, when contract was let, the name of the contractor, and the price contracted for.

HARTFORD COUNTY.

Town.	Contracts let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
Berlin	Dec. 17	Town	....	....	$ .16 cu. yd.

NEW HAVEN COUNTY.

Towns.	Contracts let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
Beacon Falls	Dec. 28	O. P. Hart	$ .23	$1.42	Gravel. $ .30 cu. yd.
Branford	Dec. 1	Michael P. Rice	.18 9/10	1.14 7/8	....
Prospect	Dec. 30	Town	....	....	$800.00

NEW LONDON COUNTY.

Towns.	Contracts let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
East Lyme	Dec. 30	Beckwith & Rogers.	$ .32	$1.25	Gravel. $ .06 lin. ft.
Stonington	Dec. 6	Edward Burke	....	....	695.00 270.00

FAIRFIELD COUNTY.

Towns.	Contracts let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
Bethel.....	Dec. 29	Annie W. Carter....	$ .14½	$1.00	....
		Peter McDonald....	.18½	1.25	....
			.19½	....	....
Easton.....	Dec. 31	Town.....	.25	1.38	....
Monroe.....	Dec. 31	Town.....	....	....	$.18 cu.yd.
Stratford.....	Dec. 24	Tooney Bros.....	.25	1.00	....
Westport.....	Dec. 31	Town	Gravel. $ .50 lin. ft.	Drain. $ .30 lin.ft.	Telford. $1.25 lin.ft.

LITCHFIELD COUNTY.

Towns.	Contracts let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
Bridgewater...	Dec. 30	Town.....	....	....	$ .85 cu.yd.
Canaan.....	Dec. 30	Town..... ...	$ .30	....	Surfacing. $1.10 lin.ft.
Goshen.....	Dec. 30	Town.....	.25	1.00	....
Harwinton ...	Dec. 31	Town.....	.20	1.50	Resurface $. 40 cu.yd.
New Milford..	Dec. 31	Town.....	.25	1.75	....
Norfolk.....	Dec. 30	Town.....	....	....	$826.00
North Canaan.	Dec. 30	Town.....	.20	.70	Gravel. $ .25 cu.yd.
Thomaston....	Dec. 15	Edward McManus...	.28½	1.43	.. .
Washington...	Dec. 30	Town.....	.30	1.75	....
			.25	1.40	....
Winchester ...	Dec. 31	Town.....	.18	.50	Cobble. $ .25 lin.ft. Wall. $1.00 cu.yd.

MIDDLESEX COUNTY.

Towns.	Contracts. let.	Contractors.	Price, cu. yd. Earth.	Rock.	Total.
Chester	Dec. 15	A. Brazos & Sons...	$ .22¾	Masonry. $2.24	....
Westbrook....	Dec. 29	David Dee.....	....	....	$.24½ cu.yd.

TOWNS SUBMITTING THE LOWEST BID.

Eleven towns having failed to comply with the requirements of the law, made the number 23 taking advantage of the grading appropriation. A very gratifying feature of the award of the contract is, that out of the 23 towns, that advertised for bids, 14 towns secured the contract to do the work themselves, leaving only 9 towns for outside contractors to do the work. A situation of this kind meets with the approval of the citizens residing in the towns for the reason that it furnishes employment to the towns-people, and secures all the money to the towns. This feature of the work this year is a new one, and a straw to show the trend of a growing disposition on the part of the towns to do their own work, and adds very much towards a friendly relationship on the part of the towns to the good roads movement.

It has been the mind of the Commissioner from the commencement of this good roads movement to have the towns do the work required to be done in their town by the towns themselves, and it will be his purpose to continue in such a policy, and the Commissioner has reason to believe that next year a greater number of towns will submit bids on the work to be done, and secure, not only a betterment of their roads, but also all the money that may be appropriated for that purpose and keeping it within the limits of the town.

The list printed below contains the names of the towns who are to do their own work, having submitted the lowest bid for the work to be done, and the contract having been awarded to them by the Commissioner.

The county securing to itself the most of the contracts town-wise, is Litchfield County, securing 9 out of 11 contracts let for the improvement of their roads under the law of 1897.

Berlin,
Bridgewater,
Canaan,
Easton,
Goshen,
Harwinton,
Monroe,
New Milford,
Norfolk,
North Canaan,
Prospect,
Washington,
Westport,
Winchester.

STATE APPROPRIATION OF 1897.

The appended tables contain the list of the towns, by counties, which applied and complied with the requirement of the law, the amount allotted by the State; and also the total amount allotted to each county, on account of the August appropriation of 1897:—

HARTFORD COUNTY.

Towns.	Amount Allotted by the State.
Bloomfield	$1,500.00
Bristol	1,500.00
East Hartford	1,500.00
East Windsor	1,500.00
Hartford	1,500.00
Manchester	1,500.00
New Britain	1,500.00
Newington	1,500.00
Plainville	1,000.00
Rocky Hill	1,500.00
Simsbury	1,150.00
Southington	1,500.00
Suffield	1,500.00
West Hartford	1,500.00
Windsor	1,500.00
Windsor Locks	1,500.00
Total	$23,150.00

NEW HAVEN COUNTY.

Towns.	Amount Allotted by the State.
Ansonia	$1,500.00
Derby	1,500.00
Hamden	1,500.00
Meriden	1,500.00
Middlebury	1,500.00
Milford	1,500.00
New Haven	1,500.00
North Branford	1,000.00
North Haven	1,500.00
Orange	1,500.00
Seymour	1,500.00
Wallingford	1,500.00
Waterbury	1,500.00
Woodbridge	1,000.00
Total	$20,000.00

NEW LONDON COUNTY.

Towns.	Amount Allotted by the State.
Groton	$1,500.00
New London	1,500.00
Norwich	1,500.00
Waterford	1,500.00
Total	$6,000.00

FAIRFIELD COUNTY.

Towns.	Amount Allotted by the State.
Bridgeport	$1,500.00
Darien	1,500.00
Fairfield	1,500.00
Greenwich	1,500.00
New Canaan	1,500.00
Norwalk	1,500.00
Ridgefield	1,500.00
Stamford	1,500.00
Weston	500.00
Total	$12,500.00

WINDHAM COUNTY.

Towns.	Amount Allotted by the State.
Killingly	$1,500.00
Plainfield	1,500.00
Pomfret	1,500.00
Putnam	1,500.00
Thompson	1,500.00
Windham	1,500.00
Total	$9,000.00

LITCHFIELD COUNTY.

Towns.	Amount Allotted by the State.
Litchfield	$1,500.00
Plymouth	1,500.00
Watertown	1,500.00
Total	$4,500.00

MIDDLESEX COUNTY.

Towns.	Amount Allotted by the State.
Clinton	$1,500.00
Cromwell	1,500.00
Durham	1,500.00
East Haddam	1,500.00
Middlefield	600.00
Middletown	1,500.00
Old Saybrook	1,500.00
Portland	1,500.00
Total	$11,100.00

TOLLAND COUNTY.

Towns.	Amount Allotted by the State.
Stafford	$1,500.00
Vernon	1,500.00
Total	$3,000.00

SUMMARY—BY COUNTIES.

The following table shows the total amount of money allotted to all the counties in the State, and includes, not only the August appropriation, but also the amount allotted to each county by the State in October for grading purposes, and for which contracts were let.

Counties.	Amount Allotted by the State.
Hartford	$23,150.00
New Haven	20,000.00
New London	6,000.00
Fairfield	12,500.00
Windham	9,000.00
Litchfield	4,500.00
Middlesex	11,100.00
Tolland	3,000.00
Total	$89,250.00
GRADING ROADS—	
Total	8,947.00
Total	$98,197.00

HIGHWAY IMPROVEMENTS—

The following tables show the list of the towns which have in 1897, arranged by counties, names of contractors, when the kind of road, state of work at the close of the season, kind of

HARTFORD

Town.	Contractor.	Contract let.	Contract price.	Width of stone road.
			lin. ft.	feet
Bloomfield	Williams & Dewhirst Co	Sept. 4	$1.00 1.50	15
Bristol	F. T. Ley & Co	Sept. 22	1.13½	20
East Hartford	F. A. Cadwell	Sept. 13	1.04½	16
East Windsor	John Middleton	Oct. 1	.60	20
Hartford	Patrick Hoye	Dec. 4	1.27	16
Manchester	F. T. Ley & Co	Sept. 4	1.37½	18
New Britain	Fish & Hoye	Sept. 1	1.29	12
Newington	Hartford St. Ry. Co.	Oct. 4	1.07	16
Plainville	C. B. Cadwell	Aug. 27	1.18	16
Rocky Hill	C. B. Cadwell	Sept. 4	.83	12
Simsbury	Town	Aug. 26	.80	12
Southington	Town	Sept. 10	.70 .80	14 16
Suffield	H. R. & E. Hemmingway	Oct. 16	.80	12
West Hartford	John Hoye & Co	Dec. 30	1.15	12
Windsor	J. S. Lane & Son	Aug. 16	1.20	16
Windsor Locks	W. L. Foster, Agent	July 29	1.18	12

APPROPRIATION OF 1897.

complied with the law relative to the improvement of their roads contract was let, contract price, width of road, width of shoulders, stone, native or otherwise, and the engineer employed.

COUNTY.

Width of shoulders.	Kind of road.	State of work to date.	Kind of stone.	Engineer employed.
feet				
6	macadam telford	finished	by cars	E. N. Phelps.
4	macadam	not finished	by cars	Roswell Atkins.
4	macadam	finished	by cars	W. H. Olmsted.
6	gravel	not finished	local	J. E. Egan.
16	telford	not finished	by cars	C. H. Bunce.
4	macadam	finished	by cars	W. H. Olmsted.
8	telford	not finished	by cars	W. H. Cadwell.
10	telford	not finished	by cars	Hartford St. Railway Co.
6	macadam	finished	by cars	Dunham & Oldershaw.
8	telford macadam	not finished	local	T. H. McKenzie.
6	macadam	not finished	local	C. W. Eddy.
..... 6	gravel slag	not finished	local	Dunham & Oldershaw.
12	macadam	not finished	local	J. E. Egan.
6	telford	not finished	by cars	C. E. Beach.
6	macadam	finished	by cars	E. N. Phelps.
8	macadam	finished	by cars	J. E. Egan.

NEW HAVEN

Town.	Contractor.	Contract let.	Contract price.	Width of stone road.
			lin. ft.	eet
Ansonia	Royal Holbrook	Oct. 2	$1.64½ 1.89½	22 27
Derby	C. W. Blakeslee & Sons	Sept. 24	.61	33
Hamden	C. W. Blakeslee & Sons	Aug. 25	.95	20
Meriden	Thomas Kearney	Aug. 28	.97⅓	16
Middlebury	D. A. Kimberly	Oct. 1	.23½	22
Milford	A. E. Clark & Son A. E. Clark & Son Town of Milford E. N. Clark	Dec. 30	.60 .19 .90 .32	16 16 18 14
New Haven	C. W. Blakeslee & Sons	Oct. 25	.....	16
North Branford	S. B. Maltby Ford & Gates	Sept. 15	1.38 1.25	14 16
North Haven	Lawrence Bruce	Sept. 21	.88	16
Orange	E. R. Redfield	Aug. 28	1.54	24
Seymour	Royal Holbrook	Sept. 1	1.44	18
Wallingford	J. S. Lane & Son Thomas Kearney	Sept. 25–30	1.10 .99	16
Waterbury	E. McManus	Sept. 16	1.15½	20
Woodbridge	C. W. Blakeslee & Sons	Oct. 25	.....	16

COUNTY.

Width of shoulders.	Kind of road.	State of work to date.	Kind of stone.	Engineer employed.
feet				
.....	macadam	not finished	by cars	D. C. Sanford.
.....	macadam	not finished	by cars	Geo. A. Johnson.
.....	macadam	not finished	by cars	A. B. Hill.
8	macadam, telford	not finished	local	S. C. Pierson.
.....	grading	not finished	.....	C. B. Harger.
6 6 6 6	gravel, macadam	not finished	local	Frank E. Hine.
8–14	macadam, telford, gravel	not finished	local	A. B. Hill.
8 12	macadam	finished	local	A. B. Hill.
4	macadam	not finished	local	D. C. Sanford.
12	macadam	not finished	by cars	Nichols & Potter.
3	macadam	finished	by cars	D. C. Sanford.
8	macadam	not finished	by cars	J. M. McKenzie.
6	gravel	not finished	local	W. G. Smith.
16	macadam, telford, gravel	not finished	local	A. B. Hill.

NEW LONDON

Town.	Contractor.	Contract let.	Contract price.	Width of stone road.
			lin. ft.	feet
Groton	H. L. M. Ladd	Sept. 9	$1.10½	16
New London	J. S. Lane & Son	Sept. 13	sq. yd. .63	25
Norwich	Amos D. Bridge	Sept. 17	sq. yd. .63	20
Waterford	H. L. M. Ladd	Sept. 20	1.07	25

FAIRFIELD

			lin. ft.	feet
Bridgeport	B. D. Pierce Jr. Co	Sept. 25	$1.06	16
Darien	Bates & Downes	Sept. 20	1.00	20
Fairfield	Oliver G. Jennings	Dec. 13	1.15	16
Greenwich	Daniel Murray	Oct. 19	1.29½	20
New Canaan	J. F. Silliman & Co	Dec. 30		16
Norwalk	Michael Lubrano	Dec. 28	.29 cob'le .90 rock .15 earth	30
Ridgefield	B. D. Pierce Jr. Co	Sept. 9	1.33	16
Stamford	John O. Merritt		1.40	20–25
Weston	Ebenezer Coley	Oct. 30	.49	

COUNTY.

Width of shoulders.	Kind of road.	State of work to date.	Kind of stone.	Engineer employed.
feet 4	macadam	not finished	by cars local	Daball & Crandall.
6	macadam	finished	by cars	Geo. K. Crandall.
3	macadam	not finished	by cars	C. E. Chandler.
6	macadam	not finished	cars or local	Daball & Crandall.

COUNTY.

feet 8	macadam	not finished	local	Scofield & Starr.
5	macadam	not finished	local	H. A. Parsons.
6	macadam	not finished	local	Scofield & Starr.
5	macadam	not finished	local	S. E. Minor.
6	macadam	not finished	local	J. F. Silliman.
.....	grading	not finished	.....	C. N. Wood.
6	macadam	not finished	local	E. W. Keeler.
6	macadam	not finished	by cars	Wm. B. Cochrane.
.....	grading	not finished	.....	C. N. Wood.

WINDHAM

Town.	Contractor.	Contract let.	Contract price.	Width of stone road.
			lin. ft.	feet
Killingly	Town	Sept. 25	$ .65	14
Plainfield	A. Brazos & Sons	Sept. 8	.85	16
Pomfret	H. H. Davenport	Sept. 28	.99	14
Putnam	Amos D. Bridge	Sept. 14	2.08	16
Thompson	Amos D. Bridge	Nov. 20	.....	20
Windham	W. W. Ballou	Oct. 25	1.05	16

LITCHFIELD

			lin. ft.	feet
Litchfield	J. S. Lane & Son	Sept. 15	$1.97½	18
Plymouth	Town	Sept. 25	1.37½	16
Watertown	Town	Sept. 16	.43 1.00	16

COUNTY.

Width of shoulders.	Kind of road.	State of work to date.	Kind of stone.	Engineer employed.
feet 6	macadam	not finished	local	W. K. Pike.
6	macadam	finished	local	C. E. Chandler.
6	macadam	not finished	local	R. E. Mitchell.
6	macadam	not finished	local	R. E. Mitchell.
4	macadam	not finished	trap rock	F. E. Waterman.
8	macadam	not finished	trap rock	Robt. Fenton.

COUNTY.

feet 6	telford	finished	by cars	W. M. P. Shelton.
7	macadam	not finished	by cars	Roswell Atkins.
5	gravel	not finished	.....	C. W. Eddy.

MIDDLESEX

Town.	Contractor.	Contract let.	Contract price.	Width of stone road.
			lin. ft.	feet
Clinton	B. D. Pierce Jr. Co.	Oct. 7	$ .89	18
Cromwell	Town	Sept. 16	.75	14 16
Durham	O. D. Hubbard	Sept. 1	.73 .89½	16
East Haddam	B. D. Pierce Jr. Co.	Aug. 27	1.14	14
Middlefield	A. Brazos & Sons	Nov. 8	.....	12
Middletown	Macdonald & Hennessy	Aug. 16	.98	12
Old Saybrook	A. Brazos & Sons	Sept. 20	.87¾	18
Portland	Fish & Hoye	Sept 27	1.29 1.59	16

TOLLAND

			lin. ft.	feet
Stafford	B. D. Pierce Jr. Co.	Oct. 2	$ .72	16
Vernon	Williams & Dewhirst Co.	Sept. 11	1.10	14

COUNTY.

Width of shoulders.	Kind of road.	State of work to date.	Kind of stone.	Engineer employed.
feet 6	macadam	not finished	by cars	J. S. Dickinson.
6	macadam	not finished	by cars	E. P. Augur.
6	macadam	not finished	by cars	W. S. Clark.
6	macadam	finished	local	E. P. Augur.
6	macadam	not finished	local	W. S. Clark.
8	macadam telford	not finished	by cars	E. P. Augur.
6	macadam	not finished	by cars	J. S. Dickinson.
6	macadam telford	not finished	by cars	E. P. Augur.

COUNTY.

feet 6	macadam	not finished	local	E. Y. Fisk.
12	macadam	finished	by cars	T. H. McKnight.

HIGHWAY IMPROVEMENTS—

The following table gives general information regarding the
were constructed under the appropriation
Seventy-one roads were contracted for under 1897 ap-

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Bloomfield....	Williams & Dewhirst Co	macadam telford	15 0	6 0	5 13	1.00 1.50	.....
East Haddam..	B. D. Pierce Jr. Co....	macadam	14 0	6 0	7	1.14	.....
East Hartford..	Frank A. Cadwell....	macadam	16 0	4 0	7	1.04½	.....
Litchfield.....	John S. Lane & Son...	telford	18 0	6 0	13	1.97½	.....
Middletown....	McDonald & Hennessy	macadam telford	12 0	8 0	7 13	.98	.....
Manchester...	Fred T. Ley & Co.....	macadam	18 0	4 0	7	1.37½	.....
New London...	John S. Lane & Son...	macadam	25 0	6 0	7	.....	.63
North Branford	Samuel D. Maltby.... Ford and Gates.....	macadam	14 0 16 0	8 0 12 0	7	1.38 1.25	.....
Plainfield	A. Brazos & Sons.....	macadam	16 0	6 0	7	0.85	gutters .49¾
Plainville.....	Chas. B. Cadwell.....	macadam	16 0	6 0	7	1.18	.....
Seymour	Royal Holbrook.....	macadam	18 0	3 0	7	1.44	.....
Vernon	Williams & Dewhirst Co	macadam	14 0	12 0	7	1.10	.....
Windsor.....	John S. Lane & Son...	macadam	16 0	6 0	7	1.20	.....
Windsor Locks..	W. L. Foster, Ag't...	macadam	12 0	8 0	7	1.18	.....

APPROPRIATION OF 1897—*Continued.*

"State Roads"—in fourteen out of eighty-five towns—which
of 1897 and completed during that year.
propriation, but remained to be completed during 1898.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
.....	all	med.	3 m.	steam	earth	stone	2,555.	E. N. Phelps.
all	.....	heavy	1 m.	steam	earth	.....	2,653.	E. P. Augur.
.....	all	light	1 m.	steam	earth	.....	2,664.	W. H. Olmsted.
8 in. bot. cse	5 in. course	med.	1 m	steam	earth	.....	1,519.	W. M. P. Shelton.
8 in. bot.cse	5in cse 7in.cse	med.	1¾ m.	steam	earth	.....	3,039.	E. P. Augur.
.....	all	heavy	1 m.	steam	earth / cobble	.....	1,518.	W. H. Olmsted.
.....	all	med.	1 m	steam	earth	.....	1,714.	Geo. K. Crandall.
all	.....	med.	1 m.	horse	earth	Town	1,525.	A. B. Hill.
all	.....	med.	1 m.	steam	earth / cobble	.....	2,483.5	C. E. Chandler.
all	.....	heavy	¼ m.	steam	earth	pipe	1,695.	Dunham & Oldershaw.
4 in. course	3 in. course	med.	1½ m.	steam	earth / cobble	.....	2,156.	D. C. Sanford.
.....	all	med.	1½ m.	steam	earth	Town	2,735.	T. H. McKnight.
.....	all	med.	1 m.	steam	earth	.....	2 500.	E. N. Phelps.
.....	all	med.	1 m.	steam	earth	.....	2,500.	J. E. Egan.

CONCLUSION.

The Commissioner is not surprised that the "Good Roads Movement" did not immediately receive that hearty support that it deserved, when he remembers that during the last 37 years the Connecticut farmer has had much to contend with. At the time of our Civil War many farms were neglected or abandoned, Connecticut furnishing her quota of men to fight to preserve the Union. The State had to give up many of her noblest sons. Many of them came from the farms. Homes were broken up, and the farming industry received a serious blow. After the war was over she had hardly commenced to recover her lost ground, before the West, with all her natural advantages, wooed and won a great army of tillers of the soil. Then capital seconded their efforts, and the Western wilderness became the granary of the world. Many Connecticut farmers sold out their farms, and went West, allured by the bright prospects of more favorable farming conditions, and the work of recovering her lost ground had to be taken up by a new generation. It was not in grain alone that the West had made inroads into the farming industry of Connecticut. The great natural pastures of the West soon robbed her of profitable stock-raising, and many other profitable farm products.

Notwithstanding all these set-backs, courageously these noble young men took up the task of the restoration of her farming industries, with all these discouragements confronting them, and by their efforts, Connecticut is fast recovering her lost ground, and has a bright future.

Knowing these facts, no one can justly blame Connecticut farmers for being conservative. They have to be. The farmers of the State need all the encouragement they can receive from every source to help them into a better financial condition. I know of no factor any more helpful than "Good Roads," and the State of Connecticut owes to the farmers all she can do to give them "Good Roads," for, with increased wealth of the farmer, comes greater prosperity to the whole State.

The law now in force is right in improving the main roads,

first. These main roads drain the surrounding country, and should receive attention before improving other roads, but the present system of assistance will take many years before very much good will come from it. The financial state of the town's treasury is in such a condition in many cases that the towns cannot avail themselves of the State aid for improving their roads. So that unless some other system than the one now employed is found, the work will drag slowly along. Much money will be lost, the growth and prosperity of our little State will be dwarfed, and all the helpful influences which come from good roads will be denied to the people of our State.

I have many times suggested in my "Good Roads" talks throughout the State the necessity for, and the good that would come from a trunk line road, running from South to North, and from West to East, across the State, of uniform width the entire length, following the old original turnpike as nearly as possible, and I think that if such a road is ever built, it should be built by the State, as a State road; thus insuring, not only uniform width of road, but uniform method of construction, let under the very best and most advantageous conditions. The obligation on the town, through which this road would pass, should be the one of keeping said road in proper repair. A road of this kind would be a source of great convenience and profit to the whole State. I would not, however, recommend any abandonment of the general plan now in force of improving the main roads between the towns. I would still continue this same system, only on a more liberal basis towards the towns.

PERIOD FOR ROADMAKING.

A great deal of valuable time was lost through the summer months, in getting all the preliminary work, required by law, done. This shortened up the period for roadmaking very much, and was a great loss to all the towns in which roads had to be constructed.

The new law, in this respect, is very much superior to the old law, for in the old law, if a town did not finish its work in

December, so as to be accepted, that town could not receive the money allotted to it on the part of the State or county until the following December. This had the effect to embitter some of the towns against the "Good Roads Movement," for many towns according to the terms of their contract, had paid the contractors nearly, if not quite, all of the amount due them, and, in reality, worked a great injustice to the towns, as many of them had to borrow money to pay the contractor with, and being compelled to wait so long for the return of their money, it added to the expense of the road, also subjecting the town to a great deal of annoyance, and the tendency on the part of the Selectmen to secure to their town the money that might be due it from the State or county, naturally resulted in making them willing to accept the road before the contractor had left it in first-class condition. The new law is better in this respect—very much so—for it provides that if the work is not finished in the year in which it is commenced, the work can be continued in the following spring, and on its completion, a certificate can be given to the Comptroller which will entitle the town to receive the money immediately upon the completion of the work, and it shall be paid for as though it was completed in the year in which the work was commenced. As a result of this provision in the new law, the Commissioner, while accepting very few of the roads which have been under construction this year, has paid to the towns a very large proportion of the money allotted them, reserving the balance until the final completion and acceptance of the work next spring.

MATERIAL.

The question of material to build roads with is an important factor. While it is true and beyond contradiction that Connecticut, small as she is, has the finest trap-rock quarries to be found in the United States, these are confined to certain localities, towns, or districts, and do not extend over the entire State. In some towns we find granite, gneiss, brown-stone, feldspar, mica schist; while in other

towns, there is hardly any stone at all, and all the material for road construction, in the way of a macadam treatment, had to be imported. This adds to the expense, and makes it practicably impossible for some of the towns to have a macadam or telford road. In many towns we find banks or pits of gravel for road construction, with good bonding qualities and little sand, just the material to make a first-class road. These towns are nicely conditioned, for the Commissioner finds that gravel, intelligently used, and built under a proper specification, will make as fine a road for general purposes as anyone may wish to ride over, besides requiring no special tools or appliances, very little, if any, skilled labor, and the Commissioner has had built, some of these roads, at a cost of not over $1,000.00 per mile, and has one under contract now for less than $500.00 a mile. A gravel road, having such conditions surrounding it to build by, cannot help being popular. Other towns have very little, if any, gravel, few ledges of stone, and whatever gravel is to be found, is washed gravel, with a preponderance to sand. The Commissioner has treated several roads, having gravel of this character, and by bonding artificially, has succeeded in making some very good roads. These are only a few of the conditions which confront the towns, to make the "Good Roads Movement" somewhat unpopular.

A LIBERAL POLICY.

It has been the purpose of the Commissioner, and will continue to be his policy, while he remains in office, to meet these conditions that prevail in every way possible, and help the towns to overcome, in every way that he can, any obstacles that may interfere with the town taking advantage of the State appropriation.

The Commissioner is not wedded to any particular kind of road, as the only one that must be laid by every town in the State. Such a course would be extremely foolish, unwise, and unfair to the people, whose representative in the House and in the Senate had passed a law, the intent of which was for the purpose of assisting all the towns in the State, so that every

town might stand on the broad plane of equality, and all meet on the common level.

The attitude of the towns toward the "Good Roads Movement," has undergone a wonderful change, because a better understanding is had to-day between the Selectmen and the Commissioner, and there has been established a bond of co-partnership and co-operation between the towns and the State, relative to the "Good Roads Movement," and the Commissioner believes that this sentiment will grow, and that, with the incoming Legislature, and the experience that the towns and the Commissioner have had during '95, '96, and '97, on this question, many of the things which are to-day insurmountable obstacles to the towns will be removed, and the educational period, which we have gone through during the past three years, will be productive of great good to all concerned in this vital question.

THE "GOOD ROADS" LAW.

It is not my purpose to criticise the weak points in either of the laws that we have had to work by and under, during the past three years. It would be a difficult matter to draft a law that would suit everyone, and meet the exigencies of every town in the State. Conditions change materially in adjoining towns. Some have a large grand list, and small tax bills to pay. Others have a small grand list, and large tax bills to pay. Some towns have sixty miles to take care of; others, four hundred. But a suggestion might naturally be made that the town with the largest number of miles had the worst conditions confronting them. This may not be so, as the town with from two to four hundred miles may have a larger grand list to draw from, while the town with sixty miles might be already over-burdened with a large bonded indebtedness, and large tax list and small grand list.

I have sufficient faith in the wisdom and intelligence of the gentlemen who shall be sent to represent the interests of the several towns in the State, and feel sure that all the shortcomings of both these laws will be met, and that a law will be

drafted and passed which will be eminently satisfactory to the whole State, and I firmly believe that the "Good Roads Movement" is something which has come to stay, because I believe that it is not a thing which has come up in the night, or in the past week, or during the past three years. I believe that the farmers of the State of Connecticut have been fully awake to the necessity for better roads for many years; indeed I have traveled the State of Connecticut over, and in my travels have met, not only at the town meetings which have been largely attended, but also on the cars, and in our larger cities, at different times, men all over the State, and I have never found, in all these travels, a man who was not a firm believer in good roads. The only line of difference has always been ways and means. That question, I think, will be met when the Legislature convenes in 1899.

I have no plan or suggestion of how to provide the means necessary to carry on this work. A committee was appointed last winter who have that matter under consideration. They have intelligently, and very wisely, established a system of meetings, a number of which have been held, and many more are to be held, in different parts of the State, to hear opinions expressed by the leading men in the different localities, relative to what is necessary to be done along the line of providing a financial basis to build the roads of the State. These gentlemen were carefully and wisely selected, because of their special fitness for this duty. I am satisfied, and I think everyone in the State will agree with me when I say, that, at the convening of the next Legislature, there will be evolved some plan, whereby sufficient money can be secured to take care of the financial part of the road-building in the State of Connecticut.

Very respectfully,

JAMES H. MACDONALD,
Highway Commissioner.

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ANNUAL REPORT

OF THE

HIGHWAY COMMISSIONER

OF THE

STATE OF CONNECTICUT,

TO THE

GOVERNOR,

For the Year Ending December 31, 1898.

PRINTED BY ORDER OF THE LEGISLATURE.

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1898.

STATE OF CONNECTICUT,
HIGHWAY COMMISSIONER'S OFFICE,
HARTFORD.

To His Excellency, LORRIN A. COOKE,
Governor of the State of Connecticut:

Sir:—I have the honor to submit herewith the Fourth Annual Report for the year ending December 31, 1898.

Very respectfully yours,

JAMES H. MACDONALD,
Highway Commissioner.

FOURTH ANNUAL REPORT.

THERE has been but very little change in the conditions confronting the movement from those existing last year, except the addition of towns taking their first appropriation, a wider knowledge of technical construction, and an increased sentiment for good roads. The law is the same as last year, the disadvantages that existed under it still exist and will continue until it is changed. As I said in my last report, it would be a difficult matter to draft a law that would continue to meet all conditions that it might have to deal with, no matter how perfect the law might be at the outset.

The year now about to close has furnished an unlimited amount of employment to the Commissioner and those associated with him. The short season from July until December to get the towns in working order, let contracts and start the work, did not leave sufficient time to finish the work properly last year, so that 71 towns out of a total of 85 remained to be finished this year. In addition to this, 74 towns let contracts this year, making a total of 145 sections of roads on which improvements were being made. With so large a field to cover the inspection could not be as thorough or as constant as the work demanded. The only remedy available, where there was any doubt in regard to the road being properly constructed, was the withholding of approval by the Commissioner for some time after the contractor had notified him of the fulfillment of his contract. The character of the roads built and accepted during the past two years has suggested by their improved condition, that a tardy approval is sometimes of great benefit to the road, and insures a more perfect con-

struction by the contractor in the roads he may have to build in the future.

There is no question but what the roads of the State generally show a marked improvement over the condition they were in at the start of the good roads movement four years ago. This has not been done exclusively with the money appropriated by the State, as the towns have in very many instances spent thousands of dollars in improving their roads without any State assistance.

While the improvement is quite noticeable and the subject of remark by those familiar with the roads of the State, there still remains very much to do. Thousands of miles still remain in a deplorable condition and too plainly show the ear-marks of pilgrim days. What has existed so long can not be undone in a few years.

The attitude assumed by the State has been to meet the towns in as broad and liberal a manner as possible on any question arising between State and town, giving the utmost liberty allowable under the law, and the Commissioner has not departed from this policy except where the interest and welfare of the movement was threatened or the law in danger of being transgressed.

The evils that exist in road building are to a greater or less degree similar in nearly every town. Towns showing the greatest skill and advancement in road construction are found nearest or having access to railroads, while towns remote from railroads or large business centers show the most crude or primitive condition of their roads. Their own interests would naturally suggest that not having access to or privileges to transport their goods to market, that their roads should receive the most careful attention. This may not be, and perhaps is not any sign of a lack of knowledge of how to improve their roads, as towns away from railroads have as a rule small grand lists, and the people cannot afford to spend the money necessary to perfect their road system. This is another emphasis for a broad and liberal treatment in the conduct of the State towards the towns so situated.

The privilege of allowing any town in the State to use their appropriation for grading purposes alone has been continued with gratifying results. Several towns have taken advantage and used their appropriation for the reduction of steep grades, also for the reclaiming of soft places existing on their roads. It is now

safe to say, that of the 48 towns that have not as yet accepted State assistance, that it is due principally to one of two reasons, either the towns are financially unable to participate, or a misapprehension exists in regard to the attitude of the State towards the towns. It has been the disposition and the practice of the Commissioner in treating with the towns to so conduct the movement that it will meet the conditions which the town is surrounded by, or confronted with. While the law does not give to the Commissioner in its letter the rights and privileges he has exercised or extended, the spirit or intention of the law has been the foundation of his interpretation. The law thus interpretated has been more favorably received, and town after town are to-day enjoying the result of thus liberally construing its meaning. Some of the best, most helpful and permanent improvements have thus been made by towns that were financially weak and unable to lay a permanent stone road.

Quite a number of towns were the successful bidders for the work done in their town during the past year. This privilege accorded to the towns by the law is popular and results in many ways in yielding very satisfactory results, as towns obtain a practical knowledge of doing work under approved and successfully tested methods, also it affords employment to the people residing in the town and results in the increased benefits of not only having the State pay one-half of the improvement made in their town but also retains all the money available in the making of the improvement at home. I have many letters from towns in the State naming special cases where individuals have been assisted by reason of this privilege accorded the towns.

KNOWLEDGE OF ROAD BUILDING.

The improvement in sentiment towards the "Good Roads Movement" has shown a marked increase during the past year, and the idea advanced by many men whose only experience in road building was that they had turned a furrow on the roadside and were by that experience road builders, is fast disappearing, and a more intelligent comprehension of the subject is being had, and yet, as

between the most primitive methods of construction and the highest reach attained by expensive and scientific road building, the one comes as near to the needs of the farmer as the other. The happy medium, between the two extremes, comes closer to the solution of the question than either one of the two mentioned. The bill under which the work is now being carried on leaves the choice of the kind of road to be built entirely to the towns; this is wise, as it leaves the matter entirely in the hands of the town in the choice of material which regulates practically the cost of the road.

What the State of Connecticut wants, is a knowledge of how to build their roads, and when that knowledge is acquired we will not only have the roads throughout the entire State in a better condition, but also have more money in the town's treasury. I do not say this in a censorious spirit or as a reflection on the intelligence, neatness or thrift of the towns of our State. What is true of Connecticut is true of every other State until this great question has been taken up and thoroughly and broadly carried out under an intelligent, systematic and comprehensive method of construction. There never has been and there never will be a retrograde movement in any State that has once so started.

GRADING.

Excessive grades are found on the majority of our roads. The location of the road has often been unwisely made, where if they had given a little forethought or study to the subject, hills would have been skirted and swamp holes avoided. A great many people in looking at this great question only bring their mind to bear on the question of resistance to travel, smoothness of the road, and drainage. While these are essential and necessary, they do not constitute all that is required in scientific road building. Not enough attention has been paid to two other very important factors necessary to the proper and common sense treatment in road making, namely, the reduction of all grades to a minimum and the straightening of the road between given points. Indeed, without a careful study of these very

essential and necessary adjuncts a road will fail in its full degree of usefulness to the traveling public.

During the past two years I have been enabled to treat several roads through the medium of the money spent for grading purposes. The principal part of the work along this line is cutting down the hills and straightening the roads. This work was not only very satisfactory to the towns in which the work was done, but suggested to the Commissioner possibilities for a large field of future usefulness in this branch of road work. Some roads are so thickly settled that radical changes, either in grade or line, are impossible, which makes a very strong plea to avoid these mistakes in the layout of any future road. This part of the work is engaging the attention not only of those who are building roads for the farmers and others who have to use them, but large railroad corporations during the last few years have turned their attention to this same subject. In our own State the Consolidated railroad has spent several million dollars in a reduction of the grades, straightening their lines and improving their road-bed, thereby getting as a return a saving of time in shortening the distance, increasing the drawing power with less expense, easier travel, less friction, less repair, greater comfort and convenience to the traveling public and the saving of thousands of dollars to the company. If the mistakes we have made in the past yield as a return, reformation along these lines, the experience thus gained will save not only time and money but also insure better roads for the future.

Some towns have made a vast improvement in one particular direction, and the example is worthy of emulation by other towns in the removal of large stones and boulders from their roads. Part of this condition is a natural one, in which the out croppings of ledges show up through the road, but a great many of the boulders are a result of early methods of building roads. These stones in the road are not only a menace to life, a destruction to vehicles and unpleasant to ride over, but are also a source of great expense to the towns, in requiring, so long as they remain in the road, to be covered over with earth so that the roads will be passable and this is only a temporary relief, as the first heavy rain exposes them again. There is only one satisfactory, permanent and economical way to treat these roads

and that is to remove the stones. Some one has wisely said, "remove these stones out of the road and you will find a pot of gold under them." I think this is true, as their removal certainly is a great saving of money to all who have to use the roads. This, I believe, the towns are beginning to fully realize, as I find that where boulder roads were formally the rule, they are now beginning to be the exception.

GRAVEL ROADS.

A mistaken idea prevails to some extent that to make a perfect system of roads throughout the State, a macadam system must be inaugurated. This is not of necessity so, as I have seen many miles of road in different towns in the State of splendid natural gravel roads. What I mean by natural gravel roads, is that the roads have been laid out through a territory of gravel formation. All that was necessary in the improvement of the road was to open up the road without the addition of any other material than that found on the road itself. These roads could be made first-class by widening and shaping the road and forming gutters, thus making them first-class roads with very little expense. It would not only be extravagant but very unwise to import stone where such a condition exists to make a macadam road. In other towns of the State I have found roads of good gravelly earth where a little attention in rounding up the road and forming gutters would make them suitable for the travel they would have to accommodate.

Town after town has accepted State aid and made handsome and first-class gravel roads. Gravel banks have been discovered and purchased by towns that did not know of their existence, or if they did, failed to take advantage of them until the attitude of the State was made clear that they could have the privilege of laying a gravel construction. These gravel banks will yield to these towns a greater interest for the money invested than money deposited in the savings bank. Quite a number of towns started with a very small appropriation as an experiment, which has resulted in some of the most extensive and permanent improvements to be found in the State in road building.

The contract system found in many of the towns is

pernicious and extravagant, thousands of dollars are wasted with no return for the money expended. If the value of the gutter wash scraped back so many times on our roads was to be determined by what it has cost the towns of the State, a ton of the richest product of a Klondike mine would not be worth a shovelful of these scrapings. If every town in the State of Connecticut were to scrape off or cart away all of this worn out material and put the plow right into the banks and get some good live material and put that back on the roads in place of the gutter wash that has been made so long to do service, not one mile, but hundreds of miles in the State of Connecticut would be so much improved that it would not be necessary to put other material on the roads to make them first-class for travel.

I have traveled mile after mile over roads full of ruts, mud six inches deep in the traveled part, and seen water running along the gutters on each side, dark brown with iron that came from the banks, showing good gravel near enough to throw on the road with a shovel and thus improve their roads permanently with very little expense.

MACADAM ROADS.

Notwithstanding the privilege accorded to all the towns in the State two years ago and continued through the present year of allowing towns to grade or lay gravel roads with the money appropriated by the State, macadam construction, with or without a telford base, still continues to be the popular choice of the towns. This is due principally to the fact that we have an abundance of material to construct stone roads with in nearly every town and a scarcity of good gravel. The specifications furnished by the State under which the work is carried on, have demonstrated that if the roads are built according to the directions in the specification a poor road is practically impossible. In a majority of the towns in which macadam has been built, the roads are entirely satisfactory, and no better evidence of that fact can be shown than that those towns continue to extend their macadam system.

There is, however, great danger—owing to the low prices

for which the work was let—that without constant inspection contractors may yield to the temptation of slighting the work. In macadam construction careful attention must be paid to every detail as it resents the slightest inattention from the preparation of the road-bed on which it rests to the application of the bonding and wearing surface on the top of the finished road. Every part of the work is important and necessary for its durability and continuance. The large number of splendidly built and well wearing roads that cover many miles lying in different towns throughout the State are a testimony to the fact that if properly constructed they certainly yield a good return for the money invested. The splendid trap-rock which is found in a large number of towns throughout the State afford all the material that we can ask for in extending our macadam system at reasonable prices. Very satisfactory results have come from roads built with local stone other than "trap." All towns have the choice of building with native stone in macadam treatment if they so desire. Quite a number of towns in which there are no trap-rock have used granite found in their town and are satisfied with the results.

Telford pavements are only used where the road-bed is uncertain and requires a bridging or sustainment. These roads are not built generally as a continuous system by reason of the expense, but come under the head of "special case treatment." The depth of macadam has not been uniform on all roads, but has been arranged to suit the condition or requirement in each particular case, and has varied from four to seven inches. Macadam will always continue to have its friends and also its enemies. It does not take kindly to neglect, but if taken care of will continue in a good state of preservation for many years. It is improved by a little moisture, but is rapidly destroyed by too much water. It is fast losing friends in cities where it is laid on streets on which railroads have laid their tracks, as the cencentration of heavy travel, light grades, and the too free use of the sprinkler soon runs it into holes and makes it a constant source of expense. In my judgment it would be cheaper and more satisfactory to lay a more durable pavement, and pay the difference of additional cost. There is no reason why macadam should not continue to give good satisfaction on a

moderately wide road built on any ordinary cool soil, and sustain the average travel on any of our roads to which it can be brought without too large an expense, and still continue to be a cheap and popular pavement with towns.

GRADES.

The old term "highways" that came from the raising of the road proper above the margins of the road in low places so as to keep them perfectly dry, has made the practice of raising the center of the road too high, still the custom in many towns, and there has grown up in the State a method of construction properly called "hog-back roads," many of them with a grade of three inches to the foot. This excessive cross-slope grade invites travel to the crown of the road and results in rutting out the road, making a continual bill of expense in keeping the road in repair, besides being very difficult and uncomfortable to travel over. It has also created a habit of taking the centre of the road. This is not only true of Connecticut, but is also found in other States. In one of our sister States where roads have been improved, signs have been erected asking those who who use the roads to divide the travel.

As a remedy the State has provided a standard for cross-slope grades that does not exceed one inch to the foot. This has a tendency to distribute the travel over the road, for any part of the road is as easy to travel over as the center. The purpose of this is to make a "come-and-go" road, thus diminishing the cost of repairs and extending the life of the road. It will be some time, however, before those who use our roads overcome or out-grow the habit of taking the center of the road, as a bad habit once formed is difficult to abandon.

The necessity for longitudinal grade on the road is being understood and carried out, as the officials who have to do with this question recognize its compensation. No matter how well built a road may be, or the material used in its construction, it will by use become toe-marked or rutted except close attention is given to the matter of repairs. When a road arrives at such

a condition the cross-slope grade is unable to assist in carrying off the water, and if sufficient longitudinal grade is not given, the water falling into the ruts and center of the road will remain and hasten its destruction, and be a constant source of expense, but if sufficient grade is given to the road, it will quickly clear itself of the water and add materially to the life of the road, thus saving the necessity for a continual outlay of money in keeping a road in good condition. In many towns very little attention has been paid to these important points in drainage, but towns are beginning to fully realize that these are vital points in road building.

DRAINAGE.

The question of drainage is receiving more attention than ever before. People are beginning to understand that water is one of the most destructive forces with which our roads have to contend as they realize that it is absolutely necessary to insure any degree of stability, and permanence to the road, that a proper drainage must be had. This phase of the question has received a great deal of attention in my department and as a result a great many old culverts have been abandoned as unnecessary and a source of danger and continual expense, owing to improper construction. The covering stones have either worked away allowing the material overlaying it to fall through or not having sufficient bearing for the thickness of the stone, had broken down with the travel, making a stoppage of water. In other places the bottom of the openings to the culverts were higher than the gutters. In many instances the culverts were totally inadequate to take care of the water, in other cases entirely unnecessary. In culvert treatment throughout the State the old stone culvert has in many towns been replaced with either iron or tile pipes, put sufficiently deep under the road proper, to prevent the possibility of being destroyed by travel.

These pipe culverts readily clean themselves on account of their smooth surface, and do not require to be so large as the old stone culvert, as less diameter of culvert is required, owing to the fact that water has an uninterrupted flow. This system

of culvert work is not so expensive as the old system, for once properly laid they require very little attention and are practically indestructible.

The old method of making deep ditches on the sides of the road is becoming obsolete, ditches are being filled and gutters formed sufficiently large to take the necessary flow of water. This removes the necessity for building railings and the danger of running into the ditch is avoided as the shoulder of the road loses itself in a shallow gutter and safety is thus assured for passing teams in turning out.

Owing to the springy condition of many of our roads, a system of rubble drainage has been used with great success; indeed without proper under drainage it would be impossible to improve a great many of the roads we have been called upon to treat. The old system of filling such places with large stones has proved expensive and unsatisfactory in affording relief sought with any degree of permanency. The results from proper under-drainage have been entirely satisfactory, both in reclaiming pieces of road that were formally mire-holes and also establishing a continuance of like treatment for all roads requiring similar treatment. It has been the aim of the Commissioner, so far as possible, to remove the necessity for turning the water into the fields of abutting property thus making them the watershed of the roadside, destroying their crops and doing irreparable damage without any compensation, by carrying the water in the gutters along the road down to, and into some natural water course. This has proved to be a more satisfactory arrangement and will result in the future in similar treatment being accorded to conditions requiring it.

WIDTH OF ROADS.

The majority of the roads in the State are too narrow. The width of a road should be determined by the travel it is required to accommodate. A narrow road will concentrate travel and prove to be a very expensive road in the matter of repairs. I do not think that a main road between the towns should ever be less than twelve feet wide with three foot shoulders on each

side, nor exceed sixteen feet with a three foot shoulder on each side, except in the populous parts of a town where there is a large amount of travel; under such a condition the same general rule will apply in having it of sufficient width so as to accommodate the convenience and business of the people.

The width of the roads that we have made has ranged from twelve feet to thirty-two. The most popular width requested by the towns in the layout of their roads has been sixteen feet. A road that is too wide is adding expense both in the construction and in necessary repair, without any appreciable return and should be avoided equally as much as the too narrow road.

SELECTION OF MATERIAL.

A misapprehension seems to exist in regard to the longevity of the roads now being constructed. There is no road, no matter what the material used in its construction may be, that will last forever. If material was to be found, which up to the present time has failed of an introduction, that would last for all time, its use would be limited for the price would be prohibitive. The material for all pavements should be selected for the place they are to occupy and for the service they are intended to render. There has not up to the present time been discovered a perfect pavement either for streets or roads. A pavement only reaches its highest degree of perfection when it most nearly accepts the responsibility or obligation required of it. In the making of roads for the State the selection of the material with which to construct the roads is a very important matter, and after four years' experience the Commissioner is convinced that no iron-clad rule can be laid down as a standard for all the towns to work under, for the simple reason that it would be unpopular not only to the people of the towns who are most vitally interested in this question, but also from the fact that what is suitable and meets the needs or requirements of one town would not be suitable or desired by the people of another town, neither would it be economy to place an expensive pavement on roads with light traffic in sparsely settled communities. A common

sense view of the latter requirement would naturally suggest a gravel construction or treatment with material found in the town, easy of access and inexpensive to use in the construction of the road. The great secret of having good roads is not only to have them well built, no matter how the material used in the construction may differ, but also give them proper attention when they need repair.

NEGLECT.

The chief evil that we find is not altogether the question of the material, it is the little word "neglect." Anything in use is destined sooner or later to wear out, and the length of its life is largely determined by the care taken of it, so it is with this question of roads. The law under which I work as Commissioner should provide for the care and maintenance of the roads built, otherwise it is folly to spend either State or town money in building roads.

BEAUTIFYING THE ROADSIDE.

As I ride over the roads of the State I cannot help noticing the difference in the appearance of the roads. Some towns clear away the brush on the margins and banks between the road and the fences, thus giving an air of neatness and thrift, and also allowing for the widening of the road, the straightening and cleaning out of the water courses. The margins of the road thus treated quickly cover themselves with a strong and luxuriant growth of grass, the wild flowers that have been struggling for life have access to the sunlight they love so well, and come up with a vigorous growth, their rich bloom helping to beautify and make pleasant a heretofore dreary and unattractive roadside.

In other towns, perhaps the adjoining one, I find the bushes growing right up out of the shoulders of the road, and after a rain or heavy dew I have had many an involuntary bath by the limbs striking my buggy and relieving themselves of their moisture. A road thus neglected and allowed to grow wild it

is almost impossible to improve, gutters quickly form in the middle of the road, gullying out and making a deep toe-path, and only suggest as the reason for having the gutter there that it is cheaper to take care of one gutter than to take care of two. This is, however, not general in any town as very many farmers go out and clear away the brush in front of their property. A law should be enacted making it obligatory to cut down all brush between the fences on the highways.

I am not an enemy to shade trees on the roadside, but, on the contrary, believe a system of tree planting on our country roads will not only beautify and adorn, but also give comfort to both man and beast by their grateful shade. Trees are also helpful in keeping the road from drying out and in a semi-moist condition, which is necessary not only for the comfort and convenience of those using the road on account of dust, but also removes friction which prevents wear. They should, however, be planted not close but sufficiently back so as not to interfere with the shoulders or gutters or be liable to interfere with future improvements. A great many serious mistakes were made in the early days in road building in our State in not only the location, but also in the construction of the roads. These are made more apparent as we come to treat the question of improvements. Millions of dollars have been wasted in the past in wrong construction and millions of dollars' worth of time have been lost in traveling unnecessary distance to reach a desired point.

SUMMARY.

During the past year $97,747.50, out of the $100,000.00 has been apportioned to the towns to improve their roads, and the universal sentiment expressed is that they are entirely pleased with the assistance given to the towns by the State, and the only regret expressed is that more money was not available. Seventy-four towns have received State aid this year, and during the last four years 120 towns have applied for, and received State aid. The total number of miles improved during the last year, some of which require very little to complete them, is 48. The number of cubic yards of rock and earth excavation

moved in the making of these improvements was 58,420. The contract prices for which the work was let was entirely satisfactory, and has materially assisted the towns in accomplishing a greater number of miles of improved roads than was anticipated, and with the prices had in other States make a favorable comparison.

FUTURE OF ROAD BUILDING.

In conclusion, I rejoice in the fact that our State has taken up the "Good Roads Movement," and done so well with all that it has had to contend with. The future for road building is bright with promise, the experimental stage has been gone through with successfully. The conditions, to-day, call for a continuance and the call is imperative, while the necessity for the improvement of our roads is great and universally acknowledged. It will take both time and money before a continuous system of improved roads is accomplished, but we have made a first-class beginning and should feel encouraged to continue the good work.

The State, to-day, is in a condition to continue the work so well begun by reason of the fact that we have ample material within our border to construct roads with.

Selectmen and contractors are fully acquainted with a knowledge of proper methods of road construction. In many towns crusher plants have been erected, steam rollers purchased and are now in every way fully equipped for the work. The opposition to the movement has grown less each year while the sentiment for good roads has increased, and there is, to-day, no good reason why Connecticut should not occupy as proud a place in road improvement as any State in the Union.

Very respectfully yours,

JAMES H. MACDONALD,
Highway Commissioner.

STATE APPROPRIATION OF 1898.

The following list of towns, having complied with the provisions in Chapter CCXXIX with reference to receiving State aid, have been allotted the amounts indicated:

HARTFORD COUNTY.

	State Allotment.
Bloomfield	$1,500.00
Bristol	650.00
East Granby	1,000.00
East Hartford	1,500.00
Enfield	1,100.00
Manchester	1,500.00
Newington	1,500.00
Plainville	800.00
Rocky Hill	1,500.00
Simsbury	1,450.00
Southington	1,500.00
South Windsor	1,000.00
Suffield	1,500.00
Wethersfield	1,500.00
Windsor	1,500.00
Windsor Locks	1,500.00
Total	$21,000.00

NEW HAVEN COUNTY.

	State Allotment.
New Haven	$1,500.00
Waterbury	1,500.00
East Haven	1,000.00
Guilford	1,500.00
Hamden	1,500.00
Meriden	1,500.00
Middlebury	1,500.00
Milford	1,500.00
Naugatuck	1,500.00
North Branford	1,000.00
North Haven	1,500.00
Orange	1,500.00
Seymour	1,500.00
Wallingford	1,500.00
Woodbridge	1,250.00
Total	$21,250.00

NEW LONDON COUNTY.

	State Allotment.
New London	$1,500.00
Norwich	1,500.00
Groton	1,500.00
North Stonington	650.00
Old Lyme	1,500.00
Waterford	1,500.00
Total	$8,150.00

FAIRFIELD COUNTY.

	State Allotment.
Bridgeport	$1,500.00
Greenwich	1,500.00
Huntington	1,500.00
New Canaan	1,500.00
Norwalk	1,500.00
Ridgefield	467.50
Stamford	1,500.00
Stratford	500.00
Weston	250.00
Westport	1,500.00
Wilton	1,000.00
Total	$12,717.50

WINDHAM COUNTY.

	State Allotment.
Killingly	$1,500.00
Plainfield	1,500.00
Putnam	1,500.00
Windham	1,500.00
Woodstock	1,000.00
Total	$7,000.00

LITCHFIELD COUNTY.

	State Allotment.
Litchfield	$1,500.00
Canaan	400.00
North Canaan	1,500.00
Plymouth	400.00
Torrington	1,500.00
Thomaston	600.00
Watertown	1,500.00
Winchester	1,500.00
Woodbury	1,250.00
Total	$10,150.00

MIDDLESEX COUNTY.

	State Allotment.
Middletown	$1,500.00
Haddam	1,000.00
Chatham	1,500.00
Chester	1,500.00
Clinton	1,500.00
Cromwell	1,500.00
Durham	1,500.00
East Haddam	1,500.00
Old Saybrook	1,500.00
Portland	1,500.00
Total	$14,500.00

TOLLAND COUNTY.

	State Allotment.
Stafford	$1,500.00
Vernon	1,500.00
Total	$3,000.00

TOWNS SECURING CONTRACTS.

The following list contains the names of the towns having submitted the lowest bid and securing the contract for the work to be done in their town under the appropriation of 1898:

Berlin,
Canaan
East Granby,
Enfield,
Killingly,
North Branford,
Norwalk,
Norwich,
Portland,
Simsbury,
Torrington,
Westport.
Winchester,
Woodstock,

TOWNS GRADING.

The following list contains the names of the towns applying for an apportionment of State money for grading in 1898:

Bristol,
Canaan,
Haddam,
Huntington,
North Canaan,
North Stonington,
Plymouth,
Ridgefield,
Thomaston,
Torrington,
Weston,
Woodbury,
Woodstock.

EPITOME OF NOTABLE IMPROVEMENTS, 1897 and 1898.

The following epitome of the work that has been done during the past two years will give an intelligent idea of the nature of the improvements and the necessity requiring the work to be done, the character of the work, the difficulties that were encountered, the towns in which said work was done, also the roads that were improved and the cost of the improvement.

In these brief sketches it is not intended to cover the entire work done during the last two years, only to give a brief outline of the most notable improvements along the line of radical changes in grade and where the character of the road has been changed materially.

The tables in this report will show in full all towns in which improvements have been started or finished, and for which State money has been appropriated.

BERLIN.

The most permanent improvement made in this town with the money appropriated on the part of the State was that which was made in 1897, and consisted in a reduction of grade on the main road between East Berlin and Berlin. The road was not only straightened, but also widened. The grade reduction required the moving of 4,162 cubic yards of gravel and earth. The contract was taken by the town and the road was afterwards hardened with stone by the town.

The total cost of the improvement was $826.00.

BETHEL.

The town of Bethel received its first appropriation in 1897. This application grew out of the privilege accorded the town to use the money for grading purposes, which consisted in the moving of 1,827 cubic yards of earth and other material in the

reduction of grades and also the straightening and widening of three sections of road. The work was not done on any particular road, but embraced several portions of main roads in which change of grade and other improvements could be made by the removal or application of material.

The total cost of the work was $854.82.

BEACON FALLS.

The town of Beacon Falls accepted its first appropriation in 1897, and it was used in the widening of the main road from Waterbury to Bridgeport along the Naugatuck river, leading from Beacon Falls to Naugatuck. A very popular road, but before the improvement very much congested. This road has an added interest to the traveling public by reason of its beautiful location, as for a long distance it runs along the banks of the river, completely shaded by trees, and passes the popular summer resort "High Rock Grove," and makes a delightful drive for pleasure parties by reason of the picturesqueness of the scenery found on all sides. One could hardly realize that so much of an improvement could be made with so little money.

The total amount necessary to make the improvement was $868.06.

BRIDGEWATER.

The town of Bridgewater received its first appropriation in 1897, and the money was used for the reduction of grades. The selection for the part of the roads to be improved was very wisely made by the Selectmen. The area improved was not extensive but the improvements made will make a vast difference to the traveling public by reason of the fact that congestion to travel is removed, and the road increased in width at all points. A very marked reduction in grade was made with very little money. The work was let to the town.

The total amount of money used in making the improvement was $545.60.

BRANFORD.

The town of Branford made its first application in 1897, and the money was used in the cutting down of Barker's Hill on the main road from Branford to Stony Creek. The people who have to use the road notice a wonderful improvement accomplished in the treatment carried out and completed by the terms of the contract.

The money used was entirely for grading and the amount was $957.40.

BRISTOL.

The town of Bristol used the money appropriated by the State in 1898 in grading and graveling the main road from Terryville to Bristol. This improvement embraced a reduction in the grade, a widening of the road, a change in a large bridge, and accomplished, perfect control of all the water courses. The work was done by the town and at a very reasonable price. A great deal of rock was met in the making of the improvement and added to the difficulty of bringing the road to the established grade. As the road is used very generally by the traveling public the improvement cannot help being popular. The road will be finished in the spring.

The cost of the improvement will be about $1,300.00.

CLINTON.

The town of Clinton used the appropriation of 1898 in conducting the surface water on the main road down to a culvert. In accomplishing this a radical change in the grade was necessary, which entailed the moving of several hundred yards of earth, and in addition a macadam was laid for a long distance on this road. The straightening and widening of the shoulders and gutters was also accomplished. This makes a very beneficial and permanent improvement in a populous part of the town. A part of the road is to be curbed, sidewalks lowered

and a system of walks laid. The work gives satisfaction to the people of the town and when complete will not only be very useful to those who have to use the road, but also add materially to the convenience of the people and an increased valuation to the property.

The improvement cost $3,000.00.

CROMWELL.

The improvement in 1897 consisted in straightening the main road up through the populous part of the village through what had formally been a neglected park, throwing land thus acquired into the margins of the road, where for all time the abutting owners could beautify and give it that care and attention it needed, thus not only shortening the distance that was formally traveled in skirting the park, but also improving the appearance of the street.

The improvement also accomplished the reduction of a very heavy grade and the filling up of several bad places on a much traveled road, besides the macadamizing of the road the entire length arranged for under the plans. The road is wearing well and giving good satisfaction.

The work was contracted for by the town and cost $5,401.88.

CANAAN.

The town of Canaan accepted its first appropriation in 1897, and it was used on the road along the base of the mountain, a very popular road for travel, it being the main road between Huntsville, South Canaan and Canaan. The improvement embraces the reduction of the grade and the filling up of the road several feet, which was formally submerged at the time of freshets, and thus made impassable. By reason of this improvement the road will be passable at all times as a system of large pipes have been put at suitable intervals to carry freshet water under the road.

Not only has the road described been improved but the town has purchased a bank of first-class gravel that will be very

useful in future road improvement. The work was done by the town and done well.

The amount of money used in making improvements was $826.00.

CHATHAM.

The town of Chatham accepted its first appropriation in 1898. This improvement is one that already is very much appreciated by the town. It consisted in changing the road from the old layout so as to straighten the line. To do this it was necessary to acquire land by purchase and to lay a system of twin sewers in under the road to take care of a running stream of water, and in accomplishing these things a change of grade was made which supplied the necessary earth for the filling required. The contract price was extremely low and the benefits to the town are a reduction in grade, the removal of a clump of brush in the heart of the town, the control of the old stream through a system of sewer pipes and a macadam treatment over the entire area. It is needless to say that the influence of this improvement will do very much towards the extension of the roads in this town.

The cost of the work was $2,613.07.

CHESTER.

The first year that the town of Chester accepted State aid was in 1897, and the money was used for grading purposes on the main road from the depot up to the village, a very popular road.

The improvement consisted in the cutting down of a hill very near the depot, and a considerable reduction of grade. The material which was found in the cut was used in filling up the road on both sides of the hill, also the building of a retaining wall.

The money used was $811.38, and it was the beginning of an interest that found expression in 1898 in the town voting an appropriation of $12,000.00, of which amount the State con-

tributed $1,500.00 in laying out and completing a splendid macadam road two and one-half miles long. It is needless to say that the people of Chester are pleased with the improvement made.

EAST GRANBY.

The town of East Granby accepted its first appropriation in 1898, and it was used very wisely in reclaiming two very bad places, one on the main road from Tariffville to East Granby, and the other on the main road from Windsor Locks to East Granby. The improvement consisted of a gravel construction on a stone or telford base. The road not only gave satisfaction in regard to its quality and the manner in which it was done, but also was made popular by the town figuring on, and obtaining the contract.

The contract price was $0.60 a lineal foot.

EAST WINDSOR.

The town of East Windsor used the appropriation of 1897 in improving the main road running through Broadbrook, a road that was inclined to be very miry, and a great discomfort, not only to the people who reside in the town, but to those who have occasion to use it, as it is a very popular highway and much traveled. The improvement consisted in the making of a deep gravel construction and bringing into perfect control the evils that formally existed.

The amount of money used was $2,528.40.

EAST HARTFORD.

The town of East Hartford made a very fine improvement in 1898 on the main road from East Hartford to South Windsor. A very considerable reduction in the grade was made, the road widened and a system of under drainage laid, and the stone arch was extended and wing walled, and the entire length of the area graded was macadamized with a sixteen foot road.

The improvement was very much needed and adds very much to the system of splendid roads now existing in this town.

This improvement cost $3,575.17.

EAST HAVEN.

The town of East Haven accepted and used its first appropriation in 1898. The money was used on the Foxen main road in the reduction of a heavy grade existing at the point improved. It practically restricted the weight of the load by reason of the excessive grade existing. In the prosecution of the work quite a large amount of rock had to be moved and considerable earth which in the aggregate called for the moving of hundreds of cubic yards. A swale on the road was reclaimed by filling the road at the point causing the trouble. The road in addition to being made more easy for travel in point of grade was also macadamized and the water course stoned. A very noticeable and very much appreciated change has taken place in the road by reason of the improvement.

The improvement cost $2,000.04.

EAST HADDAM.

The town of East Haddam used the appropriation of 1897 in improving the main road from Goodspeeds to Moodus. This improvement required very heavy grading in the reduction of grades, also in the widening of the road, and providing for proper drainage, also surfacing the entire road with native stone. It is a very popular road and is subjected to constant and heavy travel. It is a favorite resort for pleasure driving, as it follows the banks of the Connecticut river, and furnishes an introduction to very many delightful features of natural scenery.

The money appropriated for 1898 was used for the extension of this road and embraced similar treatment in the widening of the road, the straightening of the water courses and the reclaiming of mire-holes, and required in the payment of the contracts $6,031.46.

The road gives good satisfaction for the money invested.

EASTON.

The town of Easton used the appropriation of 1897 solely for grading purposes. A very marked reduction in the grade was made and a much needed improvement accomplished on the Easton turnpike.

The work was done by the town and entailed the moving of 1,600 cubic yards of material and will cost approximately $826.00.

EAST LYME.

The town of East Lyme used the appropriation of 1897 for grading. This was the first time the town had accepted State aid. The entire money was used in the reduction of grade, which was formally eight per cent., and is now six per cent., and the graveling of the entire area covered by the plans, and required in the making of the improvement the moving of 1,700 cubic yards of material. The road improved is the main road to Niantic, and it would be a difficult matter to realize that so great an improvement could be made or change accomplished with the amount of money spent, requiring only $800.00.

FAIRFIELD.

The town of Fairfield used the appropriation of 1897 on the main road known as the "Benson Road." It called for excessive rock cutting, cobble gutters where needed and macadam treatment.

The reduction made in the grade will result in making the road very popular for all kinds of travel. Formally the grade at one point of the road was very difficult to surmount with heavy loaded teams.

The price obtained for the work was very low. The entire improvement cost $3,852.50.

GREENWICH.

The town of Greenwich used the appropriation of 1897 on the old Boston turnpike and consisted in considerable heavy grading, rock blasting, cobble gutters and a macadam treatment. It is a splendid improvement and is very much appreciated and the benefit to the traveling public cannot be estimated.

It cost $2,999.22.

GOSHEN.

The town of Goshen took its first appropriation in 1897, and the improvement consisted of a very material reduction in the grade of two of the main roads and called for the removal of 2,600 cubic yards of earth cut and considerable rock. The road at these points was widened and straightened, and on one of the pieces a system of rubbling, tapping the springy places on the road, was used for a distance of several hundred feet. The material in the cut was found suitable for using in making a good hard and desirable surface to the road.

The cost of the improvement was $1,017.31.

GUILFORD.

The town of Guilford accepted State aid for the first time in 1898. The appropriation was used in improving nearly three miles of road, and the road improved was the main road between Guilford and Branford. The improvement consisted of a reduction of grades, the filling up of the old road bed and the graveling of the entire surface. The contract was let for a very low figure and when finished will make a splendid improvement. The town has purchased a large gravel privilege by reason of the improvement being done, which will make a valuable property for the use of the town in improving their roads with gravel treatment.

The improvement when finished will cost $3,000.00.

HUNTINGTON.

The town of Huntington is using its appropriation of 1898 in making a splendid improvement in the reduction of grade on the Bridgeport main road.

It will call for the removal of 200 cubic yards of earth and 1,000 cubic yards of rock, and will make one of the best permanent improvements in road construction that has been made in their town.

The money called for under the terms of the contract will be about $3,000.00.

HADDAM.

The town of Haddam accepted its first appropriation in 1898 for grading and surfacing with gravel the main road called the Middlesex turnpike. The principal part of the improvement will consist in a change in the location of the road, which accomplishes a shortening of the distance by a very considerable number of feet and a very material reduction of grade. The old grade was 15 per cent., the new grade when complete will make a permanent improvement for all time.

The contract was let at a very reasonable figure and the total cost of the work will not exceed $2,000.00. The road is one that is used very much as it is a direct road from Higganum to Haddam, and now that it has been improved and the weakest part in the road eliminated, it will become more popular to the traveling public.

HARWINTON.

The town of Harwinton accepted its first appropriation in 1897, and used it on the main road from East Litchfield station to Harwinton. It was a very difficult piece of work as it was mostly rock work of the shell rock nature and the process that had to be used, mostly hand-work, made it difficult in carrying

out the improvement, which consisted in the reduction of grade and the widening of the road, something that was very much needed, and since the completion of the work very much satisfaction has been expressed. The number of cubic yards of rock and earth moved was about six hundred and the cost of the improvement was $605.38.

KILLINGLY.

The town of Killingly used the appropriations of 1897 and 1898 in the improvement of two of its main roads with a macadam treatment.

A very considerable change in grade and line was made with the 1898 appropriation. Both contracts were taken by the town at a very low figure and the people of the town are very much pleased with both pieces of the work done.

The total cost of the improvements was $5,853.80.

MIDDLEFIELD.

This improvement was made under the appropriation of 1897, and consisted of a very considerable amount of grading in rock and earth and also a macadam treatment on the main road between Middletown and Meriden called the "Mountain Road." The price for which the work was let was extremely low and the improvement gives the utmost satisfaction.

The improvement required the expenditure of $1,200.00.

MANCHESTER.

The improvement made in the town of Manchester in 1897 was a very helpful one to the traveling public, not only in the reduction of the grade requiring several hundred cubic yards of material to be moved, but also the widening of a heretofore too narrow road, and a macadam treatment being applied on what had always been a very sandy soil, thus removing all re-

strictions heretofore existing to the use of the road. The improvement was made on the main road between South Manchester and Manchester and cost in the making of the improvement $2,087.34.

MILFORD.

The appropriation of 1897 was distributed in the improvements made over four different roads, two of which received a macadam treatment, and two gravel. The price for which all of the contracts were let was extremely low, and resulted in accomplishing the improvement of several long stretches of roads, and by reason of the improvement having been made on several roads, a great deal of satisfaction has been expressed in regard to the amount of work done and its benefit to the town. The stone for the macadam treatment was furnished by the town, as the town has acquired a trap-rock quarry and a crushing plant.

The total improvement cost $3,000.13.

MERIDEN.

The town of Meriden used its appropriation of 1898 in making a change in the grade on the main road from Meriden to Middletown.

The travel on this road is very heavy and the condition of the road very unsatisfactory to those who had to use it before the improvement. A system of cobble gutters was laid and a straightening and widening of the road made. This practically makes a closing link between Middletown and Meriden.

The cost of the improvement was $3,629.32.

MIDDLETOWN.

Middletown used the appropriation of 1898 on the main road from Middletown to Durham. The road is one that is used very much between these two towns, and the grade being a continuous heavy one, and the character of the road being inclined to

mire, the road was a continual source of expense in keeping it in repair. A considerable reduction in the grade has been made, the dips in the road have been taken out, the water courses straightened and a macadam laid over the entire area improved.

MIDDLEBURY.

This town has used all of the appropriations since the beginning of the "Good Roads Movement," covering a period of four years in the straightening, widening, reduction of the grades and graveling their roads. The appropriation of 1897 was used in abandoning the old road that was continually being subjected to washings by freshets from the hillsides, and making an entire new layout. This is really a splendid improvement over the old road as all the water courses now are controlled by the gutters and a system of under drainage.

The appropriation of 1898 was used in finishing up the work begun in 1897. Middlebury has done more perhaps, in the way of grading than any other town in the State of Connecticut, in the making of radical changes in layout, and also in the reduction of the grades formally existing on their roads. In this they have been very materially assisted by one of their town's men whose modesty forbids the use of his name. I wish we had more of such men in the State.

The cost of the work for 1898 was $2,684.61.

MONROE.

The town of Monroe took its first appropriation in 1897, to be used exclusively for grading purposes in the removal of ledges found on the roads, the widening of the roads and the reduction of grades. The work is not quite finished but will be in the early spring. These improvements are being made on several main roads in different parts of the town and will cost when completed about $600.00.

The work is being done by the town.

NEW HAVEN.

The appropriation of 1897 was used by the town in the improvement of what is called Long Hill on Fountain Street, the main road between New Haven and Ansonia. This improvement has made a wonderful change in the grade. The former grade of the hill was eleven per cent., and has been reduced for the major portion of the hill to six per cent. In the carrying out of the terms of the contract to the established line, it required the removal of about 5,000 cubic yards of rock and earth.

This road was not only a very difficult one to surmount by reason of its heavy grades but quite a number of springs existed under the road, making it very difficult to drive over in the early spring or late fall. The springs have all been destroyed and a macadam treatment given the entire surface. This improvement is certainly a great convenience to the traveling public and gives splendid satisfaction to those who have occasion to use it. The cost of the work was $4,924.14.

The amount paid by the State towards this improvement was $1,500.00.

NEWINGTON.

The town of Newington made a splendid improvement in 1897 on the main road between Hartford and Newington called "Under the Mountain" road, by a change in the location of the road and abolishing two dangerous railroad crossings, which assured safety to the traveling public. The improvement not only accomplished this fact but in addition widened the road and furnished a better road than the old construction which was one of gravelly earth, also shortening the distance. This new road has a telford base and a macadam top. The attitude of the railroad in giving its land, doing the necessary grading and paying one-half of the expense materially assisted the town in the accomplishment of this very great improvement.

The cost of the improvement was $3,000.00.

NORWALK.

The town of Norwalk used its appropriation in 1897 on a main road known as the Connecticut turnpike, at a point on the road called Armory Hill, a very precipitous hill of 9.5 per cent. which required in the treatment necessary to reduce the grade a great deal of rock blasting and the removal of 4,539 cubic yards of material, also the cobbling of the gutters. The improvement makes a wonderful change from the former existing conditions and the cost of the improvement was $3,466.34.

The people are very much pleased with the improvement made, also a portion of the same appropriation was used in the grading of the Connecticut turnpike, widening of the road, and the graveling of the surface. The price for which the work was let, in both instances, accomplished an improvement that will benefit the road for all time.

NEW BRITAIN.

New Britain used its appropriation of 1897 on the main road, between New Britain and Newington, called the "Newington" road. The improvement required the moving of 1,000 cubic yards of material and laying a telford base with macadam top. This road has always been avoided in the early spring and late fall by reason of the clayey condition of the soil and its tendency to mire teams using it. It is now in splendid condition and considering the amount of material moved, and the telford construction given the road, the work was done at a very reasonable price, and the benefit is incalculable to people using the road.

The cost of the improvement was $3,534.60.

NEW MILFORD.

The town of New Milford used its appropriation in 1897 in doing the work on the New Preston main road, and consisted in widening the road, reducing the grade and re-surfacing the

road with gravel. The distance covered and the improvement of the conditions which formally existed was very great, and the people are very much pleased with what has been done on the road with the money it has cost to accomplish it.

The sum of $874.00 was used.

NORFOLK.

The town of Norfolk used its first appropriation in 1897 for the purpose of reducing the grade in rock blasting and earth cutting on the main road leading to Winsted and also for re-surfacing the road after the grade was reduced with gravel. The improvement makes quite a change in the character of the road and also affords an easement to travel.

The money used for making the improvement was $826.00.

NORTH CANAAN.

This town accepted its first appropriation in 1897. It was the beginning of perhaps the finest and most helpful improvement so far made under the "Good Roads Law" since it came into existence. The first appropriation was used principally in the change of the layout of the old road, carrying it away some two hundred feet from where it formally ran parallel and near to the railroad. A dangerous crossing existed on this road that was reached by a grade of 17 per cent., and the danger was enhanced by a precipitous nest of rocks, hiding the cars from view as they came around a sharp curve. The improvement when finished will remove all danger, as the highway will go under the railroad instead of as formally, at grade. The grade of the road when finished will not exceed six per cent. There is no question but this is the most radical change in highway work made under the Commission since it started. The price for which the work was let was very reasonable, and while the improvement is not yet complete the people of the town are very much pleased with it.

The estimated cost of the improvement, covering a distance of 1,980 feet, will be about $5,000.00. This improvement grew out of the grading appropriation.

NORWICH.

The town of Norwich used the appropriation of 1898 on the Yantic main road. This stretch of road was always a source of discomfort to those who had occasion to use it, by reason of the inclination of the road to soften up and hold water, and being somewhat congested by its narrowness the road in the improvement was widened, a system of cobble gutters laid the entire length and a macadam treatment given.

The work was done by the town at a very low figure and it is certainly a splendid piece of work.

The cost of the improvement was $3,000.76.

NORTH STONINGTON.

The town of North Stonington used the appropriation of 1898 in improving three sections on main roads, accomplishing a reduction of grades, a widening and straightening of the road, and hardening the surface by gravel treatment. This improvement is certainly a beneficial one both in the grade and character of the road and will yield a good return to the town for the money invested. Earth and rock moved 3,500 cubic yards.

The total expense for doing the work was $1,242.70.

NEW CANAAN.

The town of New Canaan used the appropriation of 1898 on the main road between Railroad Avenue and Bank Street. The road that was improved was practically unfit for travel at certain seasons of the year, and was avoided by reason of imperfect drainage and the character of the material of which the road was built.

The road has been raised up considerably higher than the old road proper and a heavy sustainment of gravel put in over the entire surface improved, on which was laid a macadam treatment. The road will now be smooth and firm for travel at all seasons of the year. This piece of work was the extension of the

macadam road done in the town in 1895, and has not only succeeded in making the road very popular to those who have occasion to use it, but will also have a tendency to increase the valuation of the abutting property as it is on the ridge.

The total cost of the work was $2,900.06.

ORANGE.

The town of Orange made a very valuable addition to its system of good roads with its appropriation of 1898 on the shore road to Milford, a very popular drive by reason of its being a shorter distance to Milford and also running along the sound front. The improvement consisted in a re-arrangement of the water courses and also a reclaiming of several bad places on the road by a telford construction and the removal of several hundred cubic yards of material, after which a macadam treatment was given the entire road.

The work was done at a reasonable price and the entire cost was $3,244.38.

OLD SAYBROOK.

The town of Old Saybrook used the appropriation of 1898 in completing the macadam system already laid to Saybrook Point on the main road. This improvement completes the road down to the Point, so that a magnificent macadam road now extends from the depot down to Saybrook Point. It is certainly a fine piece of road and gives great satisfaction.

The price for which the work was let was one of the best prices offered for that class of work this year.

The total cost was $2,745.26.

PUTNAM.

The town of Putnam used the appropriation of 1898 in accomplishing a very much needed improvement on the main road from Putnam to Pomfret. This piece completes a macadam system from the city line in Putnam to the town line of Pomfret.

Excessive heavy grading was necessary in the reduction of the grades and a system of rubble drainage was laid for several hundred feet through the center of the road, enabling the water to leak out into the gutters.

The part of the road treated with rubbling was impassable in the early spring and late fall, on account of its springy condition. It is now reclaimed and given to the public for use for all time.

The cost of the improvement was $3,168.00.

PLAINVILLE.

The town of Plainville in 1897 made a splendid improvement on the main road between New Britain and Plainville in not only laying a macadam construction, but also in reducing the grade and widening the road, which involved the moving of about 3,000 cubic yards of material.

The price for which the work was done was very reasonable and made it possible for the town to make this improvement at very low prices. As this is a main road and very much used the improvement is very much enjoyed by those who have occasion to travel between New Britain and Plainville.

The cost of the improvement was $2,000.00.

PROSPECT.

The town of Prospect accepted its first appropriation in 1897 for grading and graveling the road. The selection of the road and the portion of the road to be improved was very wisely made. The improvement consisted in the removal of 3,000 cubic yards of rock and earth which accomplished the widening of the road and also the reduction of the grade from 14 per cent. to 7 per cent.

The work was done by the town and involved the expenditure of $800.00.

PORTLAND.

The town of Portland used the appropriation of 1898 in making an extensive change of grade on the main road between Portland and Colchester. The improvement called for the moving of about 2,500 cubic yards of rock and earth in grade reduction and in widening the road. It was a very difficult piece of work on account of the character of the rock, it being difficult to blast out.

The major portion of the expense entailed was caused by the large amount of rock and earth to be moved. The contract also required a macadam treatment.

This road is very much traveled, and by its improvement, has reclaimed a piece of road that was heretofore very inconvenient to use by heavy loaded teams. The contract was let to the town.

The cost of the improvement was $2,996.40.

RIDGEFIELD.

The town of Ridgefield used its 1898 appropriation for the first time for grading purposes. The other appropriations accepted by the town were used for macadamizing their roads. The appropriation of 1898 was used on the main road running from New Canaan to Ridgefield. The portion of the road graded commenced at the New York State line and extended towards Ridgefield. Two very steep hills were treated and a very severe cut made in both, and an intervening hollow filled.

The grade as it formally existed was over 10 per cent. The grade now is 7 per cent. At the point of juncture with the New York State line a cut of two feet was made. The road was hardened with the material found in the cut, and the road properly rounded up. This is acknowledged to be not only one of the best improvements made in the town on any of their roads, but also one of the most satisfactory.

The cost of the work was only $647.50.

ROCKY HILL.

The town of Rocky Hill used the appropriation of 1898 on the Wethersfield and Middletown main road. The point selected to be improved was one that needed improvement very much. The road was very heavy in its grades in some parts and too low in other parts.

The heavy cuts that were made were used in the fills and the road was widened and straightened and attention paid to carrying the water to water courses. The whole surface was macadamized, the stone for the macadam construction was taken out of a ledge that cropped out into the road. At a point where the ledge showed, the road needed to be cut down to reduce the grade. The stone taken out of the road was used in making the new macadam, a very nice arrangement and made a very helpful improvement at a very small cost to the town.

The price for doing the work was $3,024.30.

SIMSBURY.

The town of Simsbury accepted State aid for the first time in 1897. The money used in the improvement accomplished the widening of the road and the reduction of a grade of 7.5 per cent. to 3.4 per cent., and also a macadam treatment over the entire area on which grade reduction had been made. This macadam pavement made a splendid improvement on a road whose condition was such as to make it unpopular, for the road was practically restricted to light driving before the improvement. The work was done by the town and done well. The entire cost of the improvement was $2,300.00.

The work in addition to macadam treatment involved the removal of 3,680 cubic yards of earth.

SEYMOUR.

The appropriation of 1897 was used by the town of Seymour in the reduction of the grade, which involved the moving of hundreds of cubic yards of material and a macadam treatment,

cobble gutters and widening and straightening the road. The road is very popular as it is the main road between Oxford and Seymour.

The cost for making the improvement was $3,105.50.

SOUTHINGTON.

The town of Southington divided its appropriation of 1897 on two main roads. Both improvements were the same, a gravel construction, except that the base of one road was slag and the other a telford base.

Both pieces gave entire satisfaction for the money invested and cost $3,000.00.

STAFFORD.

The town of Stafford used the major portion of its appropriation in 1897 on the main road leading to Stafford Springs. This is without doubt the most notable improvement in this town in road construction that has been made, as it not only reduced the grade materially, which called for the moving of 1,767 cubic yards of material, but also improved the road with a first-class macadam, and widened and straightened the road and reclaimed some very bad mire-holes which formally existed in the area covered by the terms of the contract.

The amount of money spent in the improvement was $3,000.00.

The change is very noticeable to those acquainted with the road as it formally existed.

STONINGTON.

The town of Stonington used its appropriation in 1897 for grading purposes exclusively, in improving the Pawcatuck main road, and the improvement was really one of the worst places on the road between the two towns, and the cut accomplished the reduction of the grade from 14 per cent. to 8.5 per cent., and it removes for all time an objectionable road feature. The contractor removed about 2,500 cubic yards of material.

The improvement cost $826.00.

STRATFORD.

The town of Stratford used its entire appropriation in 1897 principally in widening a very narrow road at a point near Washington bridge on the main road between Stratford and Bridgeport, also reducing the grade at this point from 6.5 per cent. to 4 per cent., and filled up the road with the material excavated to about high water mark. The road had formally at times been submerged. This improvement made possible the moving of the railroad tracks several feet away from the traveled part, and accomplished a greater convenience and ease in traveling, also a greater degree of safety to those who might have occasion to use the road.

The improvement called for 1,324 cubic yards of rock and earth and cost $709.05.

The town of Stratford also used the appropriation of 1898 in another very necessary improvement in the grading of a piece of the main road that was difficult to travel by reason of the excessive grade at the point treated. The grade at this point was 15 per cent. The grade of the road now is 5 per cent. A very bad crook was taken out of the road, and the road straightened. The amount of material removed was about 3,300 cubic yards, and it was used in filling and widening the road at a point that was very low. The cut and the fill accomplished the improvement for a very small amount of money.

The entire cost was $1,143.18.

THOMASTON.

The town of Thomaston used its appropriation in 1897 in grading the main road between Thomaston and Watertown. A very objectionable and difficult grade existed at the point improved and it was remedied by the removal of 452 cubic yards of rock and 394 cubic yards of earth, $354.53 being appropriated for that purpose, and the road was made very pleasant to travel over by surfacing with gravel. Those who have occasion to travel that road speak of the change as being very helpful and a great convenience.

TORRINGTON.

The town of Torrington used the appropriation of 1898 in reduction of grade and the filling in of several bad mire places that occurred on the main road between Torrington and Winsted, also surfacing and widening the road with material found in the cuts. The improvement will be a great benefit to all who have to use the road and a further improvement was made by taking out a bend in the road and making a new layout, thus straightening the road and shortening the distance. The work was done by the town and done well, and at a reasonable price. While the road is not entirely finished a marked improvement is shown over its former condition by what has already been done. The town has this year set up a new crusher, purchased a steam roller, and have been running both in the building of new macadam roads, townwise, at their own expense, during the past year. The example is worthy of following as it will not be long before Torrington will have as fine a system of roads as any town in the State.

The cost of the improvement was $3,114.53.

WETHERSFIELD.

The town of Wethersfield used the appropriation of 1898 in reclaiming perhaps one of the worst pieces of roads to be found in the State. The condition of the soil was such as to make necessary at certain seasons of the year a treatment of brush to sustain travel.

A thousand yards of gravel was necessary to fill up the road-bed before commencing to put down the telford construction, after which a macadam top was placed on the telford, and as a result they have a splendid piece of good, hard and smooth road that can be used at all seasons of the year with profit and satisfaction.

The entire improvement cost $3,181.41.

WATERBURY.

The town of Waterbury used the appropriation of 1898 in continuing the gravel road begun last year. The entire road between Oakville and Waterbury will be finished by the expenditure of a small appropriation next year on the part of Waterbury. The road is very popular and used a great deal, and with its increased width of roadway, and a firm surface will make it still more popular. The people are very much pleased with it.

The cost of the construction was $3,291.75.

WESTON.

The town of Weston accepted its first appropriation in 1897, and the money appropriated was used in making a change from the old road through land acquired by the town, to accomplish the reduction of a grade of 10 per cent. to a grade of 6 per cent. The work was let for the sum of $0.49 per lineal foot and is not quite finished, but when completed and open for travel will be a great improvement over the old road and layout.

WEST HARTFORD.

The town of West Hartford in 1897 used the appropriation for improving a portion of the highway from Hartford to Newington, naturally a popular road for a greater portion of the year, but avoided in the early spring and late fall by reason of the lack of proper drainage, and the character of the material composing the road. These objections have been overcome in the improvement by a system of drainage, and a telford construction with macadam top.

The total cost of the improvement, which was made at a very reasonable figure, was $3,000.00.

WATERTOWN.

The town of Watertown used the money appropriated on the part of the State in 1897 for the purpose of changing the layout of the main road at a point between Oakville and Watertown on the main road from Watertown to Waterbury. The grade of the old road at the point indicated was excessive and very difficult to travel over with heavy loads, and inasmuch as the expense entailed in a reduction of the grade would have been great in the difficulties to be overcome in rock blasting and paying damages to abutting owners, therefore a new layout ordered.

State and town money was used in improving the new layout. This accomplished not only the saving of several hundred feet of distance, but the reduction of the grade from 8 per cent. to 4 per cent. The land damages and construction will only cost the sum of $4,000.00.

The people are very much pleased with the work so far as it has made progress. It will be finished in the early spring as very little remains to complete it.

WESTBROOK.

The town of Westbrook accepted its first appropriation in 1897, and it was used in improving the main road at points designated as M. Pratt's hill, Church hill, Stokes hill and Lewis hill.

These places were in need of treatment very much and their improvement was accomplished to the satisfaction of the people of the town for the very reasonable figure of $548.53.

WASHINGTON.

The town of Washington accepted its first appropriation in 1897, and it was used in improving the New Preston and Washington main road at two points. Its greatest degree of importance in the making of the improvement was the straightening of the road at one point, and the reduction of the grade and the cobbling of the gutters at another.

This improvement will be a great convenience to the people

of Washington in the future as it is a permanent improvement. The amount of money was very small as compared with the benefits extended.

The cost of the improvement was $412.88.

WINCHESTER.

The town of Winchester accepted its first appropriation in 1897, and applied it on South Main and White Streets, helping in conjunction with the appropriation on the part of the town in widening the road some twenty feet and the setting back and reduction of a stone wall to an average of six to eleven feet, and also a very remarkable reduction of grade and cobbling of gutters.

The appropriation of 1898 was used by the town in surfacing the improvement made in 1897, with a macadam treatment, and the road to-day shows a marked improvement from the condition it occupied before the improvement had been made. The people of the town are very much pleased with it. The money spent on the part of the State in the making of the improvements was $1,913.00. That spent on the part of the town, $3,087.00.

The total cost of the improvement was $5,000.00.

WILTON.

The town of Wilton used the appropriation of 1898 in continuing the gravel construction. The appropriation was divided and used on two of the main roads, the main road to New Canaan and the main road to Danbury. The road was made considerably wider, grades were reduced and the roads straightened, also some bad swale places reclaimed. In carrying out the line of grade considerable ledge work had to be done, and with the large amount of grading necessary to do some of it, very expensive. The contract was let at a very reasonable price. The gravel found at Wilton is very good gravel and the roads formally built are giving good satisfaction. The people of the town are very well satisfied with the investment.

The cost of the improvement will be about $2,000.00.

WESTPORT.

The town of Westport used the appropriations of 1897 and 1898 on the main road between the depot and Westport in graveling, rubble draining, widening the road and making several changes. The road at this point had formally been inclined to mire in the late fall and early spring, and was somewhat springy. All soft places on the road have been given a treatment of stone telford work as a base or sustainment for the gravel construction, and it is safe to say that the town will not suffer the inconvenience they have heretofore by reason of a defective roadway. The work was done by the town and the width of the road graveled is 32 feet, 16 feet on each side of the railroad.

The price was very reasonable, and the cost of the work was $3,826.00.

WINDHAM.

The town of Windham has made a very great improvement on the South Windham and Willimantic road with its appropriation of 1897, in the reduction of the grade at a point on the road known as Dugway hill. The contract price for which the work was let enabled the town to make a wonderful reduction in the grade which was over 9 per cent. to 6 per cent., and required the moving of 6,000 cubic yards of material in accomplishing it. The material from the cut was used in filling the low plain lying between Dugway hill and Hoxey hill, and the balance of the money not required in the grading, was used in treating the surface so far as the appropriation would allow with macadam.

The appropriation of 1898 was used in making another remarkable change in grade on Hoxey hill on the same road, and the balance of the appropriation of 1898 was used in extending the macadam system from the point at which the appropriation stopped in 1897.

These improvements make a decided change, and the benefits

by reason of these changes in the grade, are such as to please the people of the town of Windham very much, and no doubt will result in the extension of the improvement next year up to the point reached in the grade improved on Hoxey hill.

The money used in the making of both of these improvements was $5,985.98.

WOODBRIDGE.

The town of Woodbridge used its appropriation of 1897 in conjunction with the town of New Haven on the Ansonia turnpike in continuing the Long hill improvement. The selection of the road to be improved was very wisely made and the convenience to those who have to use the road by reason of the improvement was great. It was at the point improved a bad place in the spring and fall of the year, but by the improvement made, the road will be smooth and firm and convenient for travel at all times. The money used for making the improvement was $2,000.00, a portion of which came from the appropriation of 1898.

WOODSTOCK.

The town of Woodstock accepted State aid for the first time in 1898, and made two very important and helpful changes with their money in improving two of their main roads. The improvement on one of the roads consisted in cutting down and reducing a very steep grade, and putting a system of rubble drainage at a point in the road that was formally full of springholes, thus drying out the road and forming an outlet for the springs down into the gutters, also in the reclaiming of a long stretch of low lying road by putting in a fill of several hundred feet, thus making the road dryer, and also insuring a road that will be useful at all seasons of the year by a gravel construction. This improvement was made in South Woodstock, the other improvement was made on the road leading to Putnam, and consisted in widening the road for quite a long distance, filling

several feet where it had been inclined to mire, and also surfacing the entire distance with a heavy coat of gravel. One-half of the improvement was done by the town, and the other half let to outside contractors. Considering the amount of work done and the improvement made on the roads mentioned, the price was very low.

The entire cost was $2,000.00.

WOODBURY.

The town of Woodbury accepted its first appropriation in 1898 for graveling and grading purposes. The appropriation was divided between the main road running through the village and the Middlebury main road.

The main road through the village was brought up to a grade sufficiently to carry the water nicely, and a system of drainage provided to take care of a very light grade which formally existed, and through which the water ran sluggishly and had a tendency to soak into the road rather than being carried off by the gutters on the side, which made the road difficult and unpleasant at certain seasons of the year to use. The improvement in grade and material with which the road is to be finished, will make a splendid improvement at a very reasonable cost.

Access to gravel was so convenient and without any expense except the carting, that the contractor was enabled to furnish a low price for the work. The grading contract consisted in a very radical change in grade and called for rock cutting, and the moving of a large amount of material, some 4,800 cubic yards. The road will be straightened and widened, and as it is a road that is used a great deal it will be a great convenience to the people who have occasion to travel over it.

The cost of both improvements will not exceed $2,500.00.

The following tables give valuable information in regard to the work that has been done or now in process of construction —nearly all of which is complete in furnishing the information relative to the towns in which the work was done—the contractors doing the work, the character of the work done as a matter of reference and data, and arranged by towns alphabetically in the county in which said work was done.

HIGHWAY IMPROVEMENTS—

General information of the sixty-one towns letting contracts under
Ten towns still have roads to be

HARTFORD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Bristol	Fred T. Ley & Co.	macadam	20 0	4 0	7	1.13½	.....
Berlin	Town	grading	20 0	.....	....	....	.16cu.y.
East Windsor	John Middleton	gravel	20 0	6 0	18	.60	.....
Newington	Hartford Street R'y Co	telford	16 0	10 0	13	1.07	grad. .30cu.
New Britain	Fish & Hoye	telford	12 0	8 0	13	1.29	... ..
Rocky Hill	C. B. Cadwell	macadam telford	12 0	8 0	7 13	.83	.....
Simsbury	Town	macadam	12 0	6 0	7	.80	grad. .12cu.
Southington	Town	slag gravel	14 0 16 0	6 0	14 9	.80 .70	.....
Suffield	H. R. & E. Hemmingway	macadam	12 0	12 0	7	.80	.....

APPROPRIATION OF 1897.

the appropriation of 1897, but finished and accepted during 1898.
finished and accepted during 1899.

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
.....	all	med.	¾ m.	steam	earth	.....	2,603.6	Roswell Atkins.
.....	.....	xhe'vy	.....	.....	earth	.....	1,320.	S. E. Pierson.
all	.....	heavy	1 m.	horse	earth	pipe	4,214.	J. E. Egan.
all	.....	med.	¼ m.	steam	earth, cobble	pipe, stone	3,000.	Hartford St. R'y Co.
8 in. course	5 in. course	heavy	4 m.	steam	earth, cobble	stone	2,740.	Wm. H. Cadwell.
all	.....	med.	¼ m.	steam	earth	.....	3,800.	T. H. McKenzie.
all	.....	heavy	2 m.	horse	earth	.....	1,435.	C. W. Eddy.
all	.....	heavy	1 m.	steam	earth	pipe	3,235.	Dunham & Oldersbaw.
all	.....	med.	1½ m.	horse	earth	.....	3,325.	J. E. Egan.

NEW HAVEN

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Beacon Falls...	O. P. Hart.....	grading	20 0	.....	....	E. .23cu.y. R. 1.42cu.y. G. .30cu.y.	
Branford	Michael P. Rice.....	grading	.....	.....	....	E. .18 9/10 cy R. 1.14 7/8 c.y.	
Derby..... ..	C. W. Blakeslee & Sons	macadam	16 0	.....	7	.....	.61
Hamden.....	C. W. Blakeslee & Sons	macadam	20 0	.....	7	.95	.....
Middlebury....	D. A. Kimberly.....	grading	22 0	.....	...	E. .23½c.y. R. 1.20cu.y.	
Milford.....	A. E. Clark & Son...	macadam	16 0	6 0	7	.59	
	A. E. Clark & Son...	gravel	22 0	.....	6	.19	
	Town.....	macadam	8 0	6 0	7	90	.....
	E. N. Clark.....	gravel	14 0	6 0	6	.32	
New Haven....	C. W. Blakeslee & Sons	macadam telford gravel	16 0	8 0 14 0	7–13 8–14	total $3,000.	
North Haven...	Lawrence Bruce.....	macadam	16 0	4 0	7	.88	.....
Orange.....	Ed. R. Redfield.....	macadam	24 0	12 0	7	1.54	.....
Woodbridge....	C. W. Blakeslee & Sons	macadam telford gravel	16 0	16 0	7–13 8–14	total $2,000.	
Wallingford....	John S. Lane & Son..	macadam	16 0	8 0	7	1.10	
	Thomas Kearney....					.99	.....
Waterbury.....	Edward McManus.....	gravel	20 0	6 0	14	1.15½	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
.....	.....	x he'vy	.. ..	.....	earth	.....	3,960.	Fred'k H. Meyers.
.....	.....	x he'vy	.....	.....	earth	.....	2,640.	Nichols & Potter.
.....	all	light	½ m.	steam	.....	.....	2,346.	Geo. A. Johnson.
all	.....	light	1½ m.	steam	earth	.....	3,157.9	A. B. Hill.
.....	.....	heavy	¼ m.	horse	earth	stone	2,640.	E. P. Harger.
all	.....	med.	2 m.	horse	earth / cobble	stone	7,614.	Frank E. Hine.
all	.....	heavy	3 m.	steam	earth	stone	2,632.	A. B. Hill.
all	.....	light	1½ m.	steam	earth	.....	1,525.	D. C. Sanford.
all	.....	light	2 m.	steam	trap	.....	1,950.	Nichols & Potter.
all	.....	heavy	1 m.	steam	earth	.....	2,744.	A. B. Hill.
.....	all	light	½ m	steam	earth	stone / pipe	2,820.	J. M. McKenzie.
all	.....	heavy	¾ m.	steam	earth	.. ...	2,850.	W. G. Smith.

NEW LONDON

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
East Lyme.....	Beckwith & Rogers...	grading	20 0	.....	....	E. .32 cu.y. R. 1.25 cu.y. G. .06 cu.y.	
Groton.....	H. L. M. Ladd.....	macadam	16 0	4 0	7	1.00	... ..
Norwich.....	A. D. Bridge.....	macadam	20 0	3 0	7	....	G. .36 M. .63
Stonington.....	Edward Burke.....	grading	18 0	.....	....	total $965.00	
Waterford.....	H. L. M. Ladd.....	macadam	25 0	6 0	7	1.07	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
. ....	.....	x he'vy	. ....	.....	earth	.....	1,056.	.....
6 in course	screenings	med.	1 m.	steam	earth cobble	stone	2,715.	Daball & Crandall.
.....	all	light	¼ m.	steam	earth cobble	.....	1,925.5	C. E. Chandler.
.....	.....	x he'vy	.....	.....	earth	.....	700.	Daball & Crandall.
all	.....	med.	¾ m.	steam	earth	.....	2,800.	Daball & Crandall.

FAIRFIELD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price. Lineal foot.	Price. Square yard.
			ft. in.	ft. in.	in.	$	$
Bridgeport	B. D. Pierce Jr. Co.	macadam	16 0	8 0	7	1.06	.....
Bethel	Annie Carter. / Peter McDonald	grading	20 0	.....	..	E. .14½c.y. / .18½c.y. R. 1.00cu.y.	
						E. .19½c.y. R. 1.25cu.y.	
Darien	Bates & Downes	macadam	20 0	5 0	7	1.00	. ...
Fairfield	Oliver G. Jennings	macadam	16 0	6 0	7	1.15½	.....
Greenwich	Daniel Murray	macadam	20 0	5 0	7	1.29½	... .
Norwalk	John Franzilli	grading	22 0	.....	....	$1,438. entire	
	Michael Lubrano	grading	30 0	.....	..	R. .90cu.y. E. .15cu.y. grav. .29sq.y.	
New Canaan	John F. Silliman	macadam	16 0	6 0	7	$3,000. entire	
Ridgefield	B. D. Pierce Jr. Co.	macadam	16 0	6 0	7	1.33	.....
Stamford	John O. Merritt	macadam	20 0 / 25 0	5 0	7	1.40	.....
Stratford	Tooney Bros	grading	40 0	.....	.	E. .25cu.y. R. 1.00cu.y.	
Westport	Town	gravel	16 0	2 0	14	1.25 gravel / .50 gutters / .30 rubble	

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
all	.....	light	1½ m.	steam	town	town	lin. ft. 2,984.	Scofield & Starr.
.....	.....	x he'vy	.....	.....	earth	.....	1,320.	Charles Brown.
all	.....	med.	2 m.	steam	earth / cobble	town	3,000.	H. A. Parsons.
all	.....	heavy	1½ m.	horse	earth / cobble	stone	3,350.	Scofield & Starr.
all	.....	heavy	¼ m.	steam	earth / cobble	pipe stone	2,316.	S. E. Minor.
all	.....	heavy	.....	.....	earth	.....		
...	.....	heavy	¼ m.	steam	earth / cobble	town	5,125.	C. N. Wood.
all	.....	light	2 m.	steam	earth / cobble	pipe	2,847.	J. E. Silliman.
all	.....	med.	1 m.	steam	earth / cobble	stone	2,128.	E. W. Keeler.
4 in. course	3 in. course	light	1 m.	steam	town	.....	2,142.85	W. B. Cochrane.
.....	.....	x he'vy	.....	.....	earth	.....	1,320.	Scofield & Starr.
all	.....	x he'vy	.....	horse	earth / cobble	stone	1,504.	Scofield & Starr.

WINDHAM

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Killingly	Town	macadam	14 0	6 0	7	.65	...
Putnam	Amos D. Bridge	macadam	16 0	6 0	7	2.08	.....
Pomfret	Albert B. Smith.... H. H. Davenport....	macadam	14 0	6 0	7	.99	grad. .23
Thompson	Amos D. Bridge.	macadam	20 0	4 0	7	total $3,000.	
Windham	Wiliard W. Ballou..	grading macadam	16 0	8 0	7	total 875. 1.05	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
all	.. ...	med.	½ m.	steam	cobble	town	2,700.	W. K. Pike.
.....	all	x he'vy	2 m.	steam	earth	.....	2,340.	R. E. Mitchell.
all	.....	heavy	2½ m.	horse	earth cobble	pipe stone	2,023.	R. E. Mitchell.
6 in. course	1 in. scr'ngs	light	¼ m.	steam	earth	stone	2,054.	Frank E. Waterman
.....	all	heavy	1½ m,	steam	earth	pipe stone	2,028.	Robert Fenton.

LITCHFIELD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price. Lineal foot.	Price. Square yard.
			ft. in.	ft. in.	in.	$	$
Bridgewater	Town	grading	15 0				.85cu.y.
Canaan	Town	grading	20 0			total $826.00	
Goshen	Town	grading	20 0			E. .25cu.y. R. 1.00cu.y.	
Harwinton	Town	grading	16 0			E. .20cu.y. R. 1.50cu.y. resurfaced .40cu.y.	
New Milford	Town	grading	22 0			E. .25cu.y. R. 1.75cu.y.	
Norfolk	Town	grading	16 0			total $826.00	
North Canaan	Town	grading	24 0			E. .20cu.y. R. .70cu.y. G. .25cu.y.	
Plymouth	Town	macadam	16 0	7 0	7	1.13¾	
Prospect	Town	grading	16 0			total $800.00	
Thomaston	Edward McManus	grading				E. .28½c.y. R. 1.43cu.y.	
Watertown	Town	gravel	16 0	5 0	8 14	.43 1.00	

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
.....	.....	x he'vy	.....	.....	earth	.....	1,980.	A. H. Sturdervant.
.....	.....	x he'vy	.....	.....	earth	.....	1,320.	Benj. Sedgwick.
.....	.....	x he'vy	.....	.....	earth	.....	2,640.	S. B. Patterson.
.....	.....	x he'vy	.....	.....	earth	.....	1,320.	S. B. Patterson.
.....	.....	x he'vy	.....	.....	earth	.....	5,280.	.....
.....	.....	x he'vy	.....	.....	earth	.....	4,620.	E. E. Brown.
.....	.....	x he'vy	.....	.....	earth	.....	1,980.	Scofield & Starr.
.....	all	med.	½ m.	steam	earth	pipe	2,990.	Roswell Atkins.
.....	.....	x he'vy	.....	.....	earth	.....	2,640.	.....
.....	.....	x he'vy	.....	.....	earth	.....	1,100.	William G. Smith.
all	.....	med.	¾ m.	steam	earth	pipe stone	4,159.	C. W. Eddy.

MIDDLESEX

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Clinton	B. D. Pierce Jr. Co.	macadam	18 0	6 0	5	.89	.....
Cromwell	Town	macadam	14 0 16 0	6 0	7	.75	... ..
Chester	A. Brazos & Sons	grading	20 0	.....	....	$400.00 entire	
Durham	Oliver D. Hubbard	macadam	16 0	6 0	5 7	.73 .89½	.....
Old Saybrook	A. Brazos & Sons	macadam	18 0	6 0	5	.87¾	.....
Portland	Fish & Hoye	macadam telford	16 0	6 0	7 13	1.29 1.59	.....
Westbrook	David J. Dee	grading	28 0	.....	. ..	....	.24½c.y.

TOLLAND

			ft. in.	ft. in.	in.	$	$
Stafford	B. D. Pierce Jr. Co.	macadam	16 0	6 0	7	E. .30cu.y. R. .98cu.y. .72 cul.	$1.00

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
.....	all	light	⅜ m.	steam	earth / cob'le	.. ..	lin. ft. 3,376.	J. S. Dickinson.
.....	all	heavy	1 m.	horse / steam	earth	.....	4,000.	E. P. Augur.
.....	.....	x he'vy	.....	.....	earth	.....	2,640.	C. B. Voice.
.....	all	heavy	1½ m.	horse	earth	pipe	4,027.2	W. S. Clark.
.....	all	med.	1¼ m.	steam	earth	.....	3,415.	J. S. Dickinson.
8 in. course	7 & 5 in. course	med.	2 m.	steam	earth	.....	1,902.	E. P. Augur.
.....	.....	x he'vy	.....	.....	earth	... ..	2,080.	J. S. Dickinson.

COUNTY.

all	.....	heavy	1½ m.	steam	earth	pipe	lin. ft. 2,856.2	G. Y. Fisk

HIGHWAY IMPROVEMENTS—

General information in regard to the roads completed or unfinished

HARTFORD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	
Bloomfield	Williams & Dewhirst Co	macadam	14 0	3 0	5 to 7	.90	
Bristol	Town	gravel	16 0	3 0	6	.26	
Enfield	Town	macadam	16 0	6 0	7	.70	
East Granby	Town	gravel	16 0	1 0	14	.60	
East Hartford	Fish & Hoye	macadam	16 0	3 0	7	1.30	
Manchester	Hall & Donahue	macadam	18 0	6 0 / 3 0	7	.84	
Newington	Frank A. Cadwell	telford	12 0	4 0	13	.93	
Plainville	Frank A. Cadwell	macadam	13 0	4 0	7	.82½	
Rocky Hill	Amos D. Bridge	macadam	12 0	4 0	7	.85	
Simsbury	Town	grading / macadam	12 0	3 0	5	.12 / .40	
Southington	B. D. Pierce Jr. Co	macadam	16 0	3 0	7	.98	
South Windsor	Hall & Donahue	gravel	16 0	3 0	6	.24	
Suffield	John S. Lane & Son	macadam	12 0	6 0	7	.84 94/100	
Wethersfield	G. L. & H. Wells & F. R. Tucker	macadam / telford	16 0 / 16 0	4 0	4 / 13	.30 / 1.28	
Windsor	John S. Lane & Son	macadam	16 0	3 0	7	1.19	
Windsor Locks	D. W. Mellen	macadam	12 0	4 0	7	1.18	

APPROPRIATION OF 1898.

in the towns accepting State aid under the appropriation of 1898.

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
all	.....	light	½ m.	steam	earth	tile	.....	C. W. Eddy.
all	.....	med.	.....	horse	earth	.....	.....	Roswell Atkins.
.....	all	heavy	½ m.	steam	earth	.. ..	.....	G. N. Merrill & Co.
all	.....	med.	¼ m.	horse steam	earth	tile	.....	C. W. Eddy.
all	all	heavy	1 m.	steam	earth	stone pipe	2,739.	Wm. H. Olmsted.
.....	all	med.	½ m.	steam	earth cobble	ir. pipe $840.50	.....	Wm. H. Olmsted.
8 in. bot. cse	5 in. cse.	med.	½ m.	steam	earth	tile	3,105.	Wm. H. Cadwell.
all	.....	x light	2 m.	steam	cobble	.....	1,446.	Dunham & Oldershaw.
all	.....	heavy	¾ m.	steam	earth	.....	3,558.	T. H. Mckenzie.
all	.....	med.	1½ m.	steam	earth	.....	.....	C. W. Eddy.
all	.....	heavy	3 m.	steam	earth	stone	2,900.	T. H. McKenzie.
all	.....	light	2 m.	horse	earth	stone	8,207.	Wm. H. Olmsted.
.....	all	med.	1½ m.	steam	earth	.....	3,546.5	John E. Egan.
all	.....	light	¾ m.	steam	earth	iron pipe	4,126.75	E. N. Phelps.
all	all	med.	¾ m.	steam	earth	... ..	2,521.	E. N. Phelps.
.....	all	med.	1 m.	steam	earth	.....	2,558.5	John E. Egan.

NEW HAVEN

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
East Haven....	B. D. Pierce Jr. Co.....	macadam	14 0	3 0	7	.84	.....
Guilford.....	Blatchley Bros.....	gravel	16 0	3 0	6	.34	.....
	G. W. Dudley.....		14 0				
Hamden.....	Williams & Dewhirst Co	macadam	20 0	.....	7	1.05	.....
Meriden.....	A. Brazos & Sons...	macadam	16 0	4 0	7	.83¾	.....
		gravel			7–3	.72⅖	
Middlebury.....	J. H. Whittemore.....	gravel	20 0	1 0	6	E. .25cu.y. R.1.35cu.y. G. .30 lin.f	
Milford.....	E. N. Clark.....	macadam	20 0	.....	5	.37	.....
			16 0				
New Haven....	C. W. Blakeslee & Sons	macadam	16 6	.....	7	.....	.45
Naugatuck.....	F. A. Fagan & Co.....	macadam	18 0	.....	7	.....	.59
North Branford.	Town.....	macadam	14 0	5 0	7	.70	.....
						.90	
North Haven...	Lawrence Bruce.....	macadam	20 0	12 0	6	1.21	.....
			18 0	6 0	7	1.18	
Orange.....	R. Redfield & Son..	macadam	16 0	1 8	4	.87	.....
		telford			13		
Seymour.....	Royal Holbrook.....	macadam	20 0	....	7	1.13	.....
			18 0	3 0			
Waterbury.....	Olin P. Hart.....	gravel	20 0	3 0	14	.78	.....
Wallingford....	John S. Lane & Son..	macadam	16 0	4 0	7	.94	.....
	J. R. Strauss.....					.97	
Woodbridge....	John A. Doolittle & Co.	macadam	16 0	4 0	7	.83	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
all	.....	heavy	¼ m.	steam	earth	.....	2,381.	D. C. Sanford.
all	.....	heavy	1 m.	horse	earth	stone pipe	.....	R. E. Mitchell.
all	.....	x light	1½ m.	steam	earth	.. ..	3,499.3	A. B. Hill.
all	.....	med.	1½ m.	steam	earth	stone pipe	4,500.	S. C. Pierson.
all	.....	heavy	1 m.	steam	earth	. ....	3,456.	E. B. Harger.
all	.....	med.	1 m.	horse	.....	.....	.....	A. B. Hill.
all	.....	x light	¼ m.	steam	.....	cross-walks	.. ....	C. W. Kelley.
4 in. bot.cse	3 in. cse.	light	¼ m.	steam	.....	.....	.....	Ham & Tuttle.
all	.....	med.	1½ m.	horse	earth	.....	2,540.	A. B. Hill.
6 in. course	scr'ngs	med.	1½ m.	horse	earth	.....	3,070.2	D. C. Sanford.
all	.....	light	2 m.	steam	earth	.....	3,839.5	Nichols & Potter.
6 in. course	scr'ngs	med.	2 m.	steam	earth cobble	.....	2,523.2	D. C. Sanford.
all	.....	med.	½ m.	steam	earth	stone	... .	Wm. G. Smith.
.....	all	med.	1 m.	steam	earth	ir. pipe stone	1,975.	J. M. McKenzie.
all	.....	med.	⅜ m.	steam	earth	.....	2,659.5	A. B. Hill.

NEW LONDON

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Groton	Williams & Dewhirst Co	macadam	16 0	6 0	7	1.34	.....
New London	A. Brazos & Sons	macadam	25 0	3 0	7	1.74½	.....
Norwich	Town	grading	17 0	3 0	7	.....	.40
		macadam				.....	.55
No. Stonington	Edward McKnight	gravel	18 0	.....	6	Sec. 1	$640.00
			16 0			Sec. 2	160.75
			13 0			Sec. 3	258.75
Old Lyme	Contract not let	.....	.....	.....	...	.....	.....
Waterford	B. D. Pierce Jr. Co.	macadam	16 0	6 0	7	1.05	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
.....	all	med.	½ m.	steam	earth cobble	stone	lin. ft. 2,143.	Daball & Crandall.
.....	all	med.	1 m.	steam	earth	.....	.....	Geo. K. Crandall.
6 in. cse.	scr'ngs	med.	1 m.	steam	cobble	stone	5,676.7	G. E. Pitcher.
.....	.....	x he'vy	.....	.....	earth	stone	2,640.	C. R. Darrow.
.....	.....	.....	.....	.....	.....	.....	.....	....
4 in. bot. cse	3 in. cse.	med.	1¼ m.	steam	earth	.....	2,857.	Daball & Crandall.

FAIRFIELD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price. Lineal foot.	Price. Square yard.
			ft. in.	ft. in.	in.	$	$
Bridgeport	B. D. Pierce Jr. Co.	macadam	20 0	4 0	7	1.56	.....
Greenwich	Larson Bros.	macadam	20 0	5 0	7	1.14	.....
Huntington	A. Brazos & Sons.	grading	20 0	.....	..	E. .26cu.y. R. 1.18cu.y. Cb.g. .56cu.y.	
New Canaan	B. D. Pierce Jr. Co.	macadam gravel	16 0	5 0	5 12	1.33	.....
Norwalk	Town.	macadam	14 0	4 0	7	.98 .78	.....
Ridgefield	Bates, Downes & Fairbanks.	grading	16 0	.....	....	total $574.00	
Stamford	John O. Merritt.	macadam	25 0 20 0	2 6	7	1.34	.....
Stratford	Frank W. Cook.	gravel	16 0	4 0	6	E. .29cu.y. R. 1.25cu.y.	
Weston	Contract not let.	grading	14 0	.....	....	.....	.....
Westport	Town.	gravel	16 0	2 0	14	1.25 gravel .50 cobble g	
Wilton	Jackson & Coley.	gravel	14 0	3 0	6	.23¾	.....

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
all	.....	light	2 m.	steam	.....	.....	.....	Scofield & Starr.
all	.....	med.	¾ m.	steam	cobble / earth	iron pipe	.....	S. E. Minor.
.....	.....	x he'vy	.....	steam	earth / cobble	stone	.....	D. S. Brinsmade.
all gr'v 4 in. m.	scr'ngs	heavy	1 m.	steam	earth	tile	2,180.5	J. M. Silliman.
all	.....	heavy	¾ m.	steam	earth	.....	.....	C. N. Wood.
.....	.....	x he'vy	.....	.....	earth	.....	1,250.	E. W. Keeler.
4 in. bot.cse	3 in. cse.	med.	1½ m.	steam	earth	.....	2,238.8	W. H. Cochrane.
all	.....	x he'vy	1 m.	horse	earth	.....	.....	Scofield & Starr.
.....	.....	x he'vy	.....	.....	earth	stone	.....	C. N. Wood.
all	.....	x he'vy	.....	horse	earth / cobble	.....	6,600.	Scofield & Starr.
all	.....	x he'vy	1 m.	horse	earth	stone	.....	J. M. Silliman.

WINDHAM

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price.	
						Lineal foot.	Square yard.
			ft. in.	ft. in.	in.	$	$
Killingly	Town	macadam	26 0	.....	7	1.10	.....
Plainfield	A. Brazos & Sons	macadam	14 0 16 0	4 0	7	.79	.....
Putnam	Amos D. Bridge	macadam	14 0	.....	7	1.28	.....
Windham	Amos D. Bridge	macadam	16 0	4 0	7	1.22	Cob. .56
Woodstock	Town S. D. & F. H. Watson.	gravel grading	20 0	.....	8 ..	total $955.00 total 825.00	

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
							lin. ft.	
all	.....	med.	1½ m.	steam	cobble	.....	2,594.	W. K. Pike.
.....	all	med.	1½ m.	steam	earth / cobble	.....	4,135.	C. E. Chandler.
all	.....	med.	½ m.	steam	cobble	rubble / iron pipe	2,475.	R. E. Mitchell.
... ..	all	heavy	1½ m.	steam	.....	.....	1,553.	Robert Fenton.
all	.....	heavy	⅜ m.	horse	earth	stone	4,400.	R. E. Mitchell.

LITCHFIELD

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price. Lineal foot.	Price. Square yard.
			ft. in.	ft. in.	in.	$	$
Canaan	Town	grading	20 0	.....	....	total $400.00	
Litchfield	John S. Lane & Son	telford	16 0	3 0	13	1.74½	.....
North Canaan	M. J. Burke	grading	22 0	.....	....	E. .24cu.y. R.1.10cu.y. C.1.50cu.y.	
Plymouth	Charles I. Allen	grading	22 0	.....	....	total $775.00	
Thomaston	A. Brazos & Sons	grading	18 0	.....	....	E. .24¾c.y. R.1.10cu.y.	
Torrington	Town	grading	20 0 24 0	... ..	...	E. .16½c.y. R.1.00cu.y.	
Watertown	L. P. Hart	gravel	18 0	3 0	8 14	.65 .85 1.07	.....
Winchester	Town	macadam	16 0 24 0	.....	7	1.25 1.75	.....
Woodbury	The Abbott Bros. Co.	gravel	30 0	.....	8	.64	.....
	A. Brazos & Sons	grading	18 0	.....	....	E. .18cu.y. R.1.25cu.y.	

COUNTY.

Stone.		Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
Local.	By cars.							
.....	.....	x he'vy	.....	.....	earth	.....	lin. ft.	Walter Q. Kellogg.
8 in. bot.cse	5 in. cse.	med.	¾ m.	steam	cobble	.....	.....	T. L. Jennings.
.....	.....	x he'vy	.....	.....	earth	stone	.....	Scofield & Starr.
.....	.....	x he'vy	.....	horse	earth	.....	.....	Roswell Atkins.
. ....	.....	x he'vy	.....	steam	earth	... ..	.....	S. B. Patterson.
.....	.....	x he'vy	.....	horse	earth	wood / stone	9,000.	S. B. Patterson.
all	.....	x he'vy	½ m.	steam	earth	tile / stone	.....	C. W. Eddy.
all	.....	med.	½ m.	steam	earth	.....	2,602.	P. L. Barker.
all	.....	heavy	1 m.	horse	earth	tile	.....	E. B. Harger.

MIDDLESEX

Towns.	Contractors.	Kind of road.	Width of road.	Width of shoulder.	Depth of stone.	Price. Lineal foot.	Price. Square yard.
			ft. in.	ft. in.	in.	$	$
Chatham	N. H. Markham	macadam telford	16 0	4 0	7 13	80½ 1.29	*——
Chester	John S. Lane & Son	macadam	16 0	3 0	7	.81½	.....
Clinton	B. D. Pierce Jr. Co.	macadam	18 0	3 0	7	.83	.....
Cromwell	B. D. Pierce Jr. Co.	macadam telford	16 0	3 0	7 13	.86	.....
Durham	A. Brazos & Sons	macadam	16 0	3 0	7 9	.76 .87	.....
East Haddam	B. D. Pierce Jr. Co.	macadam telford	14 0	3 0	7 13	1.07	.....
Haddam	Fred T. Ley & Co.	grading	20 0	.....	..	earth $1,180. rock 2.50cu.y.	
Middletown	A. Brazos & Sons	macadam telford	12 0	4 0	7 13	.95	.....
Old Saybrook	A. Brazos & Sons	macadam	16 0	3 0	5	.67¾	.....
Portland	Town	macadam telford	16 0	3 0	7 13	1.10	.....

TOLLAND

			ft. in.	ft. in.	in.	$	$
Stafford	B. D. Pierce Jr. Co.	macadam	16 0	3 0	7	1.03	.....
Vernon	L. F. Hart	macadam	14 0	6 0	7	.97	.....

*Cobble gutters, $.20½ lineal foot. Culverts, $.45 and $.75 lineal foot. Rock, $1.75 cubic yard

COUNTY.

Stone. Local.	Stone. By cars.	Grading.	Length of haul.	Roller.	Gutters.	Culverts or drains.	Length of finished road.	Engineer employed.
							lin. ft.	
.....	all	heavy	½ m.	horse	cobble earth	pipe	950.	E. P. Augur.
.....	all	med.	1½ m.	steam	earth cobble	tile stone	13,200.†	Daball & Crandall.
.....	all	heavy	½ m.	steam	earth cobble	.....	3,614.3	John S. Dickinson.
8 in bot.cse	7 in.cse 5 in.cse	med.	1 m.	steam	earth	town	3,501.2	E. P. Augur.
all	.....	med.	1½ m.	steam	earth	stone tile	2,615.	S. C. Pierson.
all	.....	med.	½ m.	steam	earth	.....	2,810.	E. P. Augur.
.....	.....	x he'vy	.....	steam	earth cobble	pipe	.....	E. P. Augur.
all	.....	med.	3 m.	steam	earth	.....	3,181.8	E. P. Augur.
.....	all	light	2 m.	steam	earth cobble	.....	.....	J. S. Dickenson.
.....	all	x he'vy	1 m.	steam	earth cobble	.....	.....	E. P. Augur.

COUNTY.

							lin. ft.	
all	.....	heavy	½ m.	steam	earth	stone V. D. pipe	2,813.8	Huber D. Clark.
all	.....	heavy	½ m.	steam	earth	.....	.....	T. H. McKnight.

†Town paid $9,500.00.

COMPARATIVE STATEMENT.

The following tables show the number of towns in each county, the years they have accepted State aid, together with the total number of towns applying in each year, from 1895 to 1898, inclusive, tabulated since the beginning of the "Good Roads Movement" in 1895. A comparison will be of interest by reason of the fact that the total amount of money during 1895 and 1896, available for road improvement, was $450,000.00, while the total amount of money available during 1897 and 1898 was $400,000.00; also the amount which the towns had to pay in 1895 and 1896 was one-third, the county paying one-third; and by the law of 1897 and 1898, the towns had to pay one-half, and the State one-half; and it is a very gratifying showing that the towns applied for State assistance, in both years, for practically the entire appropriation without any county assistance.

HARTFORD COUNTY.

Number of towns improving roads in Hartford County, since the passage of the law in 1895, and the years in which they applied:—

Hartford	....	1896	1897	....
Avon	....	1896	....	....
East Granby	....	....	....	1898
Berlin	1895	1896	1897	....
Bloomfield	1895	1896	1897	1898
Bristol	1895	1896	1897	1898
East Hartford	1895	1896	1897	1898
East Windsor	1895	1896	1897	....
Enfield	1895	1896	....	1898
Farmington	1895	1896	....	....
Glastonbury	1895	1896	....	....
Granby	1895	....	....	....
Manchester	1895	1896	1897	1898
New Britain	1895	1896	1897	....
Newington	1895	1896	1897	1898
Plainville	1895	1896	1897	1898
Rocky Hill	1895	1896	1897	1898
Simsbury	....	....	1897	1898
Southington	1895	1896	1897	1898
South Windsor	1895	1896	....	1898
Suffield	1895	1896	1897	1898
West Hartford	1895	1896	1897	....
Wethersfield	1895	1896	....	1898
Windsor	1895	1896	1897	1898
Windsor Locks	1895	1896	1897	1898

25 out of the 29 towns in Hartford County have had some portion of State appropriation during the 4 years.

21 in 1895;
22 in 1896;
17 in 1897;
16 in 1898;
11 have taken all 4 appropriations.

NEW HAVEN COUNTY.

Number of towns improving roads in New Haven County, since the passage of the law in 1895, and the years in which they applied:—

New Haven.....	1895	1896	1897	1898
Waterbury	1895	....	1897	1898
Ansonia	1895	1896	1897	....
Beacon Falls.....	....	....	1897	....
Branford	....	....	1897	....
Derby	1895	1896	1897	....
East Haven.....	....	....	....	1898
Guilford	....	....	....	1898
Hamden	1895	1896	1897	1898
Meriden	1895	1896	1897	1898
Middlebury	1895	1896	1897	1898
Milford	1895	....	1897	1898
Naugatuck	....	....	....	1898
North Branford..	1895	1896	1897	1898
North Haven.....	1895	1896	1897	1898
Orange	1895	1896	1897	1898
Prospect	....	....	1897	....
Seymour	1895	1896	1897	1898
Wallingford	1895	1896	1897	1898
Woodbridge	1895	1896	1897	1898

20 out of 26 towns in New Haven County have had some portion of State appropriation during the 4 years.

14 in 1895;

12 in 1896;

17 in 1897;

15 in 1898;

10 have taken all 4 appropriations.

NEW LONDON COUNTY.

Number of towns improving roads in New London County, since the passage of the law in 1895, and the years in which they applied:—

New London.....	1895	1896	1897	1898	
Norwich	1895	1896	1897	1898	14 out of 21 towns
Bozrah	....	1896	....	....	in New London County
East Lyme.....	....	....	1897	....	have had some portion
Griswold	1895	1896	....	....	of the State appro-
Groton	1895	1896	1897	1898	priation during the 4
North Stonington.	....	....	....	1898	years.
Montville	....	1896	....	....	9 in 1895;
Old Lyme.....	....	....	....	1898	8 in 1896;
Preston	1895	....	....	....	6 in 1897;
Sprague	1895	....	....	....	6 in 1898;
Stonington	1895	....	1897	....	4 have taken all 4
Voluntown	1895	1896	....	....	appropriations.
Waterford	1895	1896	1897	1898	

FAIRFIELD COUNTY.

Number of towns improving roads in Fairfield County, since the passage of the law in 1895, and the years in which they applied:—

Bridgeport	....	....	1897	1898
Bethel	....	....	1897	....
Darien	1895	1896	1897	....
Easton	....	1896	1897	....
Fairfield	1895	1896	1897	....
Greenwich	1895	1896	1897	1898
Huntington	....	1896	....	1898
Monroe	....	....	1897	....
New Canaan.....	1895	1896	1897	1898
Norwalk	1895	1896	1897	1898
Ridgefield	1895	1896	1897	1898
Stamford	1895	1896	1897	1898
Stratford	1895	1896	1897	1898
Trumbull	1895	1896	....	....
Westport	1895	1896	1897	1898
Weston	....	....	1897	1898
Wilton	....	1896	....	1898

17 out of 23 towns in Fairfield County have had some portion of the State appropriation during the 4 years.

10 in 1895;
13 in 1896;
14 in 1897;
11 in 1898;
7 have taken all 4 appropriations.

WINDHAM COUNTY.

Number of towns improving roads in Windham County, since the passage of the law in 1895, and the years in which they applied:—

Brooklyn	1895	1896	....	....	9 out of 15 towns
Eastford	....	1896	....	....	in Windham County
Killingly	1895	1896	1897	1898	have had some portion
Plainfield	1895	1896	1897	1898	of State appropriation
Pomfret	1895	1896	1897	....	during the 4 years.
Putnam	1895	1896	1897	1898	6 in 1895; 8 in 1896;
Thompson	1895	1896	1897	....	6 in 1897; 5 in 1898;
Windham	....	1896	1897	1898	3 have taken all 4
Woodstock	....	....	....	1898	appropriations.

LITCHFIELD COUNTY.

Number of towns improving roads in Litchfield County, since the passage of the law in 1895, and the years in which they applied:—

Litchfield	1895	1896	1897	1898	
Bridgewater	....	....	1897	....	15 out of 26 towns
Canaan	....	....	1897	1898	in Litchfield County
Goshen	....	....	1897	....	have had some portion
Harwinton	....	....	1897	....	of the State appro-
New Milford.....	1895	1896	1897	....	priation during the 4
Norfolk	....	....	1897	....	years.
North Canaan....	....	....	1897	1898	5 in 1895;
Plymouth	1895	1896	1897	1898	6 in 1896;
Thomaston	1895	1896	1897	1898	13 in 1897;
Torrington	1895	1896	....	1898	9 in 1898;
Watertown	....	1896	1897	1898	3 have taken all 4
Washington	....	....	1897	....	appropriations.
Winchester	....	....	1897	1898	
Woodbury	....	....	....	1898	

MIDDLESEX COUNTY.

Number of towns improving roads in Middlesex County, since the passage of the law in 1895, and the years in which they applied:—

Middletown	1895	1896	1897	1898	
Haddam	....	....	....	1898	14 out of 15 towns
Chester	....	....	1897	1898	in Middlesex County
Chatham	....	....	....	1898	have had some portion
Clinton	....	....	1897	1898	of the State appro-
Cromwell	1895	1896	1897	1898	priation during the 4
Durham	1895	1896	1897	1898	years.
East Haddam.....	1895	1896	1897	1898	9 in 1895;
Essex.....	1895	1896	....	....	9 in 1896;
Middlefield	1895	1896	1897	....	10 in 1897;
Old Saybrook.....	1895	1896	1897	1898	10 in 1898;
Portland	1895	1896	1897	1898	6 have taken all 4
Saybrook	1895	1896	....	....	appropriations.
Westbrook	....	....	1897	....	

TOLLAND COUNTY.

Number of towns improving roads in Tolland County, since the passage of the law in 1895, and the years in which they applied:—

Andover	....	1896	....	....	6 out of 13 towns in Tolland County have had some portion of State appropriation during the 4 years.
Ellington	....	1896	....	....	
Mansfield	....	1896	....	....	
Somers	1895	1896	....	....	3 in 1895; 6 in 1896; 2 in 1897; 2 in 1898; 2 have taken all 4 appropriations.
Stafford	1895	1896	1897	1898	
Vernon	1895	1896	1897	1898	

SUMMARY—BY COUNTIES.

The following is a summary of the towns that have accepted an appropriation under the "Good Roads Law" during the past four years, arranged by counties and showing the number of towns in each county participating:—

25	out of 29 towns in	Hartford County.
20	out of 26 towns in	New Haven County.
14	out of 21 towns in	New London County.
17	out of 23 towns in	Fairfield County.
9	out of 15 towns in	Windham County.
15	out of 26 towns in	Litchfield County.
14	out of 15 towns in	Middlesex County.
6	out of 13 towns in	Tolland County.

making a sum total of 120 towns out of 168 in the State.

SUMMARY OF THE NUMBER OF TOWNS APPLYING IN 1897 AND 1898,

together with the number of towns in which roads have been accepted for each year, also the total number of roads accepted during 1897 and 1898.

Eighty-five towns contracted for work to be done under the appropriation of 1897, of which number 14 towns finished their roads, and were accepted, leaving to be finished in 1898, 71 towns.

In 1898, 74 towns contracted for their roads under the appropriation of 1898, of which number 40 towns finished their work, and the work was accepted, leaving 34 towns to be finished and accepted in 1899. During the past year, 101 roads have been accepted and money paid to the towns under the appropriations of 1897 and 1898.

The total number of miles of roads built under the appropriation of 1897, macadam and gravel, was 43 miles.

The total amount of rock and earth moved under the appropriation of 1897, principally in the reduction of grades was 65,560 cubic yards.

The total number of miles of roads built under the appropriation of 1898, of macadam and gravel roads, was 48 miles.

The total number of cubic yards of rock and earth moved in making improvements during 1898, principally in the reduction of grades was 58,420 cubic yards, making a total of 91 miles of macadam and gravel roads, and a total of rock and earth excavation in the reduction of grades of 123,980 cubic yards.

COMMUNICATIONS.

The large number of towns that had to be carried over from 1897 into 1898, suggested to the Commissioner that an early start might be of great advantage to the towns that should wish to improve their roads under State assistance. With this end in view the following circular was sent to every town in the State.

"Hartford, January 29th, 1898.

"To the Board of Selectmen,

"Town of ————,

"Gentlemen:—So that you may have ample time to carry out the requirements of the law, which I enclose with this circular, I send out thus early my first circular.

"To those who have not taken advantage of this law, and received an allotment from the State of Connecticut, for the improvement of their roads, allow me to say, that it is very essential and necessary that you read the law very carefully, so as to familiarize yourselves with all its requirements. This will not only save a great deal of your time, but will also very materially assist the Commissioner. The course to be pursued by each town in the State, as required by the law, is as follows:—

"1st—Call a town meeting, and make an appropriation, in accordance with the blank which I enclose. Then fill out the

blank, and send to the Commissioner; also the resolution passed at the meeting, making the appropriation.

"Let me call your attention specially to one feature of the law which causes considerable trouble and annoyance. If your town desires to spend, we will say for example, $500.00, on the part of the town, it naturally might be understood that a vote of your town, appropriating $500.00, would be all that would be necessary on the part of the town to do $1,000.00 worth of work. This amount, if so voted, would only insure to your town $250.00 from the State, as the law says that the State shall pay one-half of the money spent, up to a certain amount, limiting the total amount to $3,000.00. Now if you desire to do $1,000.00 worth of work, it will be necessary for you to appropriate $1,000.00. This will cover the entire contract for the work. The State then re-imburses the town for the money spent after the work is completed, between December 15th and December 31st.

"2d—Select a main highway, leading from one town to another to be improved.

"3d—Have a survey made.

"4th—Draw up a specification.

"5th—Send the survey and specification to the Highway Commissioner.

"6th—After the approval, advertise for bids for two weeks in two daily papers, circulating in the county. Send the first newspaper advertisement to the Commissioner's office.

"7th—Award the contract to the lowest bidder.

"8th—Send a copy of the contract, with the bidder's name, and the price for which the work was contracted to the Highway Commissioner. So as to reduce expenses, I have copies in my office, of macadam, telford, and gravel specifications; also grading specifications, which I will send to you, when you notify me what kind of improvement you desire to make on your roads.

"If these instructions are followed closely, there is no danger of any misunderstanding or mistake occurring. All of these requirements are unalterable, and no matter how much the Commissioner might desire to change some of them, he is compelled by law to have them complied with.

"If the work you desire to do is simply grading, cutting down hills to reduce grades, a profile will be all that will be

necessary. The other roads the Commissioner will have to have a geographical plan of, and a profile.

"If there should be any misapprehension or misunderstanding existing, the Commissioner would like to have it distinctly understood that the wish of the people residing in the several towns of the State will be met by him in every way that he can in regard to the improvement of roads, and the choice of the kind of road that you desire to have laid will be left entirely to the vote of the town or to the Selectmen, whether it be macadam or telford, or gravel; or, if you do not desire, or cannot afford, to lay a macadam or telford or gravel road, the Commissioner will allow the towns who desire to use the money allotted by the State for grading purposes, in cutting down the hills, and filling up the valleys and reducing the grades. If the financial condition of your town will not warrant an outlay of $1,500.00, vote whatever money you think that the importance of the work demands, and the town treasury will be able to meet, and the Commissioner will duplicate the amount, so far as the money that he may have at his disposal may allow; in other words, the interpretation the Commissioner places upon the law is this:— That this law was created and passed, and placed upon the statute books of the State of Connecticut, for the purpose of making a betterment in the condition of the roads in the several towns in the State of Connecticut; and in the Commissioner's interpretation of the intention of the law, he believes that the intention carries with it the right for towns to participate under its provisions to the ability of their means. It is the opinion of the Commissioner, from his experience in 1897, that many towns that can ill afford to have a fine macadam road might have a desire to spend a few hundred dollars in reducing some of their grades, and improving some of their poor roads. This fact was clearly demonstrated by the promptness of 34 towns,who applied for assistance for money that was to be apportioned by the Commissioner last October for grading purposes.

"If you therefore cannot afford to lay a macadam or telford or gravel pavement in your town, perhaps you have some one of your main roads that has a sharp grade to it that needs reducing. The Commissioner will assist your town in the reduction of this grade.

"In some of our counties, the character of the country is rolling, and the very best, the most intelligent treatment these roads can receive will be to reduce the grades. Money spent in this way is well spent, for the reduction of a grade means an increase in the weight of the load, it shortens the distance, saves time, and requires a less number of horses to do the work.

"One of the most gratifying features of the Commissioner's work in 1897 consisted in the towns themselves bidding for, and securing the contract for the town to do the work. I should very much like to see this year a large number of towns taking the contracts themselves, thereby keeping all the money at home. The law allows the Selectmen to bid on the work, on behalf of the town, and common sense would seem to suggest such a course should be pursued by, certainly all the towns who have grading to do, if they feel that they cannot figure on macadam or telford work, they have certainly no good reason why they cannot take the contract for grading, as this kind of work does not require any very large degree of ability, and very little, if any, tools or machinery to work with.

"It is an easy matter to see about how much work you can do for a certain amount of money. I enclose with this circular, a table, showing the towns who have had their work done this year, the kind of work done, the price at which the contract was let, and many other pieces of valuable information which will be of service to you in intelligently understanding everything connected with the work.

"It is the purpose of the Commissioner to have all contracts let for the 1898 appropriation as soon as April 15th. This can only be accomplished by the towns promptly holding their meetings, and getting the preliminary work done early. By so doing, you give the Commissioner more time to visit towns, by relieving him from office duties, and also secure better roads. Fall built roads are never as good as roads built in warm weather.

"There are no 'frills' in this circular. Every line of it is rock-bottom business, and, if lived up to, will result in accomplishing much good; also saving time and money to all concerned.

"Yours respectfully,

"JAMES H. MACDONALD,

"Highway Commissioner."

The following circular was sent for the purpose of emphasizing the statements set forth in the circular forwarded in January, fixing the final day for towns to apply for State aid, which allowed very nearly three months for the towns to make application, so that no town could claim any lack of opportunity to make application for State assistance. This circular was also sent to every town.

"Hartford, March 18, 1898.

"Board of Selectmen,

"Town of ————

"Gentlemen:—I have fixed April 20th as the final day for towns to apply for State aid. The numerous requirements of the law under which I have to work entail considerable time in the carrying out, prior to the letting of the contract, and so much valuable time was lost last year, getting ready, that the roads were thrown very late into the Fall. The Fall is not a good time to build roads in. The best season to construct our roads is when the weather is warm and free from rain. Our best work has been done in the hot months of the year, and if your town intends to take advantage of Chapter CCXXIX, entitled "An Act for the Improvement of Public Roads," I wish you would have the town meeting called as soon as possible and file your application, so that you may get started early.

"This is in emphasis of the circular that I sent out some months ago. Many towns have already come in, but I have not until now set a day as the final day for applications to be filed.

"Very respectfully yours,

"James H. Macdonald,

"Highway Commissioner."

All towns making application for State aid were mailed the following circular. The instructions contained in this circular proved to be very valuable, as a very large saving was made in material, which accrued to the interest of the town, in accomplishing an increased distance of improved roads.

"Hartford, March 18, 1898.

"Board of Selectmen,

"Town of ————

"Gentlemen:—Your application received and placed on file, and when the allotment is made I will notify you of the amount of money apportioned to your town. In the meantime you can proceed to have the survey made, and specifications prepared. We have here at this office State Specifications, which cover gravel, macadam, and telford roads. These specifications have been found to meet the conditions which prevail throughout the State a great deal better, providing for the uniform construction under proper methods, and we can send you a copy of either one of the above mentioned specifications on application.

"Now, just a word in regard to having your survey made. When your engineer is surveying for the road, will you kindly have him place on his map that is to be sent to me for approval the character of the soil, so that I may be able to determine the proper depth of stone to be used. This will not take him long, as it can readily be told by walking over it, together with the information which you may be able to give him what the character of the soil is, and then I can readily specify the proper depth of pavement to go on each particular part of the road. If a good gravel foundation is already there, why, it would suggest naturally that we do not need that depth of stone that it would require where it is sandy, or where it is swampy or liable to heave, and if he will mark on his plan between the stations the character of the soil, it will enable me to save thousands of dollars, and increase the distance that your town may have of road. I think this is very important, and I want to make the money in my hands go just as far as possible, and where it is not necessary to lay a heavy pavement, why, I propose not to do so.

"As I go on in my work, new features present themselves from time to time by reason of the experience I get, which will be of valuable assistance to the towns in carrying on this work, and this is one of them. I have seen quite a number of roads where a less depth of stone would have done, but it will be obvious to you, that with the whole State to look after, that I cannot go and inspect every road before the plans are made. I

think that when the new law is drawn, that some assistance may be given me, whereby a good deal of the time I have to use in minor matters, will be taken care of, and that I will have more opportunity to go out into the towns before the work is started. Where I have had an opportunity to do so, I have been able to do a great deal of good. I believe a great deal of money has been wasted by putting in more stone than was actually required, and I desire to obviate that, so far as possible, by the suggestion I make at this time.

"Very respectfully yours,

"J. H. MACDONALD,

"Highway Commissioner."

April 27th, the following circular was sent out to all the towns that had applied for State aid, notifying them of the amount of money that had been apportioned by the State for the improvement of public roads:—

"Hartford, April 27th, 1898.

"Hon. Board of Selectmen,

"Town of ————

"Gentlemen:—I have this day apportioned to your town the sum of $——— in conformity with Chapter CCXXIX, Statutes of the State of Connecticut, entitled "An Act for the Improvement of Public Roads."

"You will now proceed to make a survey of the proposed road, and specifications, and submit the same for approval, after which you will proceed to advertise for bids. Please send the first newspaper notice to this office.

"Very respectfully yours,

"JAMES H. MACDONALD,

"Highway Commissioner."

The following circular grew out of the fact—as disclosed in the circular—of having an unexpended balance of State money. This letter resulted in quite a number of towns, that had not taken advantage of the appropriation apportioned, accepting almost all the entire appropriation. This circular was almost identical with the one sent in 1897, which resulted in a large number of towns

applying for State aid for the first time. The applications were almost entirely for grading purposes and resulted, as shown in the epitome given in this report, in much good to the towns.

"Hartford, June 6th, 1898.

"Hon. Board of Selectmen,

"Town of ————

"Gentlemen:—Under the first allotment of money, pursuant to Chapter CCXXIX, Laws of 1897, I find a balance of a few thousand dollars still at my disposal. I have been requested by several towns to arrange for a second allotment, many towns being unable to vote $1,500.00, for road improvement, but willing to vote a few hundred dollars, if the State will duplicate the amount, to assist them in reducing grades, or in reclaiming a poor piece of road. It did not seem to be definitely understood in my first circular that towns could do so under the first appropriation. I regret this very much for I tried to make the circular perfectly clear, that the towns could use the money for macadam or gravel roads or for grading purposes.

"In conformity with the request of several towns, I now place at your disposal the privilege of a second allotment, and will name as the last day for receiving applications, August 15th, at which time all towns who desire to receive State aid must have their applications on file at this office.

"As I do not know just how many towns may apply, I cannot tell just how much any town's pro rata share of the money that I have at my disposal will be. I do not think the amount will exceed $500.00, and I hardly think it will go below $200.00 to the towns that may apply, judging from my experience of last year.

"If you desire to participate, the safest way for your town to do would be to have a resolution passed which shall read:—

"Resolved, That the town of ———— will vote an amount equal to that appropriated by the State, under Chapter CCXXIX, entitled 'An Act for the Improvement of Public Roads.'

"Enclosed you will please find a copy of the law, which will acquaint you with all that is required.

"If this circular is not clear, and your town desires to parti-

cipate, if you will kindly write me I shall be glad to answer any questions that you may feel disposed to ask.

"Yours respectfully,

"JAMES H. MACDONALD,

"Highway Commissioner."

This last circular, sent November 21st, practically closed all work on the roads for the year. Owing to the heavy snowstorm, commencing November 26th, the day set for the closing of the season's business, some difficulty was experienced in getting estimates from the towns which occasioned delay for some little time in making up the report and also apportioning State money.

"Hartford, November 21st, 1898.

"Board of Selectmen,

"Gentlemen:—Owing to the uncertainty of the weather, and the liability of frost at any moment, I deem it wise to draw to a close all work that will be affected in any way by the weather, especially macadam and telford roads. All such work now in process of construction to be left in practically a safe and finished condition for the winter, and I would name Saturday, 26th inst., as the day on which to close up the season on such work. So it would be well to advise contractors who have such work to do in your town, to cover all stones with screenings sufficient to prevent the stones from being loose and so as to tie them down, as the stone being subjected to winter wear are liable to have the corners broken and worn round, so that bonding is impossible, and I would suggest that no work be opened up, covering a larger area than can be completed by that date. I shall not accept any macadam roads after the 26th inst. Grading jobs and gravel construction where there is no frost, can be continued according to the judgment of your Board. There are quite a number of grading jobs in the State that can be continued through the winter months, such as work calling for rock blasting, or where the material to be moved is sand or gravel. Care must be taken to throw overboard all frozen lumps on the outside of embankments. It is dangerous at this time of the year to accept macadam roads, owing to the absence of sufficient heat from the sun to dry out

and season the road, also from the fact that the sub-grade is completely soaked from the recent rains. Roads finished at this time of the year are not nearly as good as those finished earlier in the season, for it is impossible to harden by roller pressure, and the tendency is for late roads to ravel and pick up next year. This order will not work any injury to any of the towns in the State in regard to receiving money, as I shall follow the same rule made last year, namely, to pay over to all towns in which work has been done, one-half of the amount of finished work done during the past season on the certificate of the selectmen and engineer. This seemed to be a pleasant arrangement, and very helpful to the towns, as it reimbursed the towns for money paid over to contractors, and pending final acceptance of the job, assisted the towns financially to meet their obligations.

"My decision to close up construction in the State on stone roads has come about through the fact that out of a dozen inspections during the last week, I found it impossible to accept the roads owing to their green condition.

"Will you kindly report to this office as soon as convenient, the present condition of the work in your town as I have to make a report to the Comptroller between the 15th and 31st days of December.

"According to law, all certificates entitling the towns to money must be sworn certificates.

"Will you kindly communicate with me if you desire for further information.

"Very respectfully yours,

"JAMES H. MACDONALD,

"Highway Commissioner."

CLASSIFICATION OF ROADS,

As computed January 1, 1896, showing the number of miles of different kinds of roads in the various counties of the State.

Counties.	Number of miles of stone or macadam roads.	Number of miles of gravel roads.	Number of miles of dirt roads.	Number of miles of main roads.	Number of miles of side roads.	Total number of miles of roads.
Hartford	178⅝	515	1,521⅜	936	1,279	2,215
New Haven	99½	227½	2,051	855	1,523	2,378
New London	26¼	21	1,499¾	645	902	1,547
Fairfield	112½	433	1,787½	1,111	1,222	2,333
Windham	9	256	1,023	412	876	1,288
Litchfield	8¼	301	1,875¾	895	1,290	2,185
Middlesex	24½	133	943½	348	753	1,101
Tolland	5	10	1,027	357	685	1,042
Totals	463⅝	1,896½	11,728⅞	5,559	8,530	14,089

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State of Connecticut.

REPORT

OF THE

SPECIAL COMMITTEE APPOINTED BY THE GENERAL ASSEMBLY OF 1897 TO INVESTIGATE THE SUBJECT OF STATE ROAD IMPROVEMENT.

PRINTED BY ORDER OF THE LEGISLATURE.

HARTFORD PRESS:
THE CASE, LOCKWOOD & BRAINARD COMPANY.
1899.

State of Connecticut,
General Assembly,
January Session, 1899.

To the General Assembly:

The undersigned, appointed a committee under the following resolution, passed at the last session of the General Assembly, viz.:

"General Assembly, January Session, A.D. 1897.

Resolved by this Assembly:

That a Joint Committee of nine, composed of one Senator and eight Representatives, one to be from each county, be raised, whose duty it shall be to investigate the subject of State road improvement, and to recommend to the next General Assembly such plan as they may deem advisable for a general system of road improvement, and providing means for the payment therefor. Said committee shall serve without pay or expense to the State."

Beg leave to report:

That in pursuance of the purpose of their appointment they have held public meetings in each of the several counties of the State, notice of the time and place of which meetings were given to the selectmen and other officials of neighboring towns, to the County Commissioners, and to the officers of banks and other financial institutions, besides which public invitation was given to all persons interested in the subject matter of the resolution, to appear at such meetings, and to be heard before this committee.

The meetings so held were largely attended, and a large degree of interest was manifested in the matter under consideration. We are unanimously of the opinion that the great mass of public sentiment throughout the State is strongly favorable to State road improvement. While the work here-

tofore done under the State laws has not in all the individual cases been of a satisfactory character, we find that the principal objections relate to the work done in the earlier stages of the system, and that the subsequent work has been of a satisfactory character, and that the experience gained in the progress of the work has been valuable both as to methods and economy of construction.

The committee requested from the selectmen of each of the towns in the State an estimate of the number of miles of inter-town highways in their several towns, together with the opinion of the selectmen as to the kinds of road best adapted to the locality, with the mileage of each kind, and furnishing blanks for reply. From the answers we estimate the total mileage of inter-town roads to be about 2,300, and that of this mileage about one-half should be macadam, and one-half gravel (Telford) construction. As macadam highway now costs about $4,700 per mile and gravel about $1,600, and as it is estimated the number of miles of each will be about equal, it is fair to assume that the average cost per mile will be about $3,150. The total estimated cost of entire construction is $6,000,000.

Under the law of 1895 there has been constructed 77 miles of macadam, and under that of 1897, 91 miles. Of the 168 towns in the State, 120 have availed themselves of State aid, at cost to the State of $332,784.33.

The original law of 1895 provided that one-third of the expense of construction should be borne by the State, one-third by the county, and one-third by the town. The county tax imposed under this law having been deemed in many instances unjust, the Assembly of 1897 substituted the present law, which divides the cost equally between the State and town.

This committee has given long, earnest, and serious consideration to the matter of a proper distribution between town and State of the cost of inter-town road construction. Public discussion thereof was specially invited at each of our meetings, and the financial condition of the towns has been care-

fully inquired into. Our conclusion, based upon existing conditions and having in mind solely the best interest of the State at large, with the desire to do full justice to the several towns, and imposing no hardship upon the smaller or the least financially prosperous towns, is that the State should pay more than one-half and the individual town the balance of the cost.

The consideration of this subject necessarily involves an inquiry into the sources of State revenue. The report of the State Treasurer for the last current years shows the moneys to have been received from the following sources:

Military commutation tax,	$154,044.60
Mutual fire insurance companies,	10,671.42
Mutual life insurance companies,	272,242.40
Railroads, steam,	910,137.50
Railroads, street,	133,052.77
Non-resident stock,	159,148.32
Savings banks,	373,370.32
Miscellaneous,	17,376.52
Avails of courts and forfeited bonds,	35,220.44
Express companies,	9,711.02
Telegraph and telephone companies,	12,527.40
Insurance commissioner,	76,659.81
Sundry taxes and receipts,	39,425.24
Collateral inheritance tax,	133,037.37
Investment tax (on notes, bonds, etc.),	87,177.19
Interest on deposits in banks, etc.,	26,954.92

A short reflection will demonstrate that but a very trifling portion of the total amount could by any possibility have been paid by the inhabitants of the smaller towns, the burden being almost exclusively upon the more wealthy and populous ones.

We believe that the general welfare will be promoted by a complete system of improved inter-town highways, and that the benefit of the people of these wealthier towns, upon whom will fall the larger part of the cost thereof, will recompense them for this outlay.

We likewise believe that while the great advantages of good over poor roads are so apparent as to need no mention, it will be a matter of economy in the smaller towns to pay a small proportion of the cost of good road construction, rather than to continue the present system of maintaining what at best are in many cases indifferent, if not absolutely poor, highways.

The committee has given serious consideration of the question of discrimination in favor of towns of a grand list of less than $1,000,000. If, in the judgment of the General Assembly, such discrimination should be made, then our recommendation is that the State should pay two-thirds of the cost of improved highways for towns with a grand list of $1,000,000, or over, and three-fourths for those whose grand list is less than $1,000,000.

We believe that experience has demonstrated that it is always advisable that there shall be in matters of government or administration a responsible head, to which proper recognition of well-performed duties may be made, or to which maladministration may be charged, as the case may be. We therefore recommend a single head to the Roads Commission, that there may be no shifting or evasion of responsibility. Suitable provision should be made for the proper inspection of work as it progresses, and we recommend that this supervision be under State control, both for economic reasons and because this only can insure practical supervision and best results.

A large saving in cost of construction may be effected by authorizing the Commissioner to consent to individual contracts by towns amounting in the whole to the full allowance of the town's appropriation for the current and the next ensuing year, whenever the town shall advance to the contractor the moneys required for the payment of that portion of the appropriation which otherwise would have been made in the second year. In such a case the payment of the State appropriation should be divided and paid by the State as

though said work had been done in the two years' separate appropriation.

In many sections of the State the reduction of the grades of highways is a matter of great importance, and we recommend that, with the approval of the Commissioner, State aid in the same proportion as in road construction be furnished the towns for the purpose of such reduction.

We also recommend that the matter of survey in cases of reduction or change of grade, with an estimated cost not exceeding $500 for such change or reduction, be left with the Commissioner, such survey to be dispensed with by him in his discretion.

Provision should be made so that where, in the opinion of the selectmen and the Commissioner, a Telford road is more practicable, and its construction more desirable than macadam, such Telford road may be constructed.

Bids for road construction should be opened in the presence of the selectmen and the Commissioner, and the award made by their joint action.

In view of past experience, the committee recommends an annual appropriation by the State of $250,000 for the purposes of road improvement. We believe that this sum will be fairly adequate for the next two years, and that this appropriation can be met from the State treasury without resorting to a State tax, or to the issuance of bonds, to either of which recourse should not be had unless unavoidable.

This sum, with the amount to be added by the towns, will build upwards of eighty miles of road each year, and leave about $30,000 to other towns for the reduction of grades, and for the expenses of administration.

If the above appropriation is continued from year to year, we may expect that within twenty-five years the whole State will be covered with a network of modern roads.

We recommend that a provision should be made prohibiting selectmen of towns from having any personal pecuniary interest in State road construction.

The maintenance of improved highways is nearly as important as their construction, as travel and the weather will develop slight defects in even the best constructed, and, unless proper repairs are made in time, a costly highway may become as rough and useless as a back country road. It has come to the knowledge of your committee that some of the roads built under the law of 1895 have been wholly neglected by the towns in which they are located, the town authorities evidently assuming that an improved highway ought to care for itself. Neither the law of 1895 or that of 1897 makes any provision for the care of the highways after they are built, presuming that the towns would care for them, as they would for roads built entirely with the town's money.

It certainly belongs to the towns to care for and maintain the roads built in part by money furnished by the State. Should they fail to do that, the State should take the matter in hand and compel the towns to do their duty in the matter.

Your committee recommend that the Highway Commissioner be instructed to inspect from time to time all highways built in part by money furnished by the State. Should he find that proper repairs are not being made upon the same, he should be authorized to notify the selectmen of the town in which they are located to cause the same to be repaired forthwith in a manner indicated by him. Should they neglect to comply with his orders, he should then go on and repair same, and charge the expense to the town, provision being made for collecting same from the town.

The members of this committee will hold themselves in readiness to appear before any committee of this Assembly, should their presence be deemed desirable.

In concluding this report we desire to express our earnest hope that the General Assembly will continue the work of inter-town road improvement until communication may be had from every town in the State to every other town therein over good, substantial, permanent roads. We believe that in no other way can our State make its towns and villages as at-

tractive to the people of other states, and desirable for residence purposes or business pursuits; that in no other way can money be so well expended for the reasonable and proper advancement of the pleasure and recreation of the general public, and that in this and the advanced material prosperity of the individual towns and of the commonwealth, which should be the objects of our solicitation, will have fully justified the expenditure incurred.

Respectfully submitted,

EDWIN O. KEELER, Chairman.
ROBERT A. GRIFFING,
JOHN I. HUTCHINSON,
JAMES PENDLETON,
MICHAEL KENEALY,
WARREN L. HALL,
WM. H. HALL,
CHARLES P. LYMAN,
GEORGE M. SAMPSON,
Committee.

State of Connecticut.

EIGHTH REPORT

OF THE

DAIRY COMMISSIONER,

MADE TO THE

GOVERNOR, A. D. 1898.

FOR THE

YEAR ENDING SEPTEMBER 30, 1898.

ORDERED PRINTED BY THE LEGISLATURE.

MERIDEN, CONN.:
PRESS OF THE REPUBLICAN PUBLISHING CO.
1898.

State of Connecticut,

DAIRY COMMISSIONER'S OFFICE,

ROOM 54, CAPITOL, HARTFORD.

TELEPHONE CALL, 1303.

JOHN B. NOBLE,
Commissioner.

ROBERT O. EATON,
Deputy Commissioner.

REPORT.

To His Excellency Lorrin A. Cooke, Governor of the State of Connecticut:

SIR:— As Dairy Commissioner of the State, I herewith have the honor to present to you my report for the year ending September 30, 1898.

One of the important laws over which this department has charge is the "Act Concerning Imitation Butter." The first law upon this subject was passed by the General Assembly of this State in 1886, and was entitled "An Act to Prevent and Punish Fraud." The title of this act shows most clearly the object for which the Legislature passed this law. It is founded upon principles which are both right and just. Under the law no one was prohibited from using oleomargarine or buying and selling it, using it in boarding houses and bakeries, providing they let the customers and consumers know at all times just what they are purchasing and using. This law has been strengthened very materially, since its original passage, by important amendments.

One important amendment was passed in 1893, which was fully explained in the report of last year. In 1895 an amendment was passed making it illegal to take orders for the future delivery of any imitation butter. The General Assembly of 1897 also amended the law by giving the Commission free access to all places where it is suspected that imitation butter is stored in transit, and making it the duty of all agents of railroads and express companies having knowledge or record of consignment of imitation butter, to inform the Commissioner or his deputy of such consignment and the name of such consignee, when requested by said Commissioner or his deputy. This amendment has added much strength to the law.

The law relating to the sale of tub butter; the law relating to the manufacture and sale of vinegar; and an act concerning the sale of adulterated molasses, are also placed under this department.

These laws and the results which have been obtained in the carrying out and sustaining them, are fully given under their proper heads later on in this report.

The complete law concerning imitation butter is herewith given:

LAW RELATING TO THE MANUFACTURE AND SALE OF IMITATION BUTTER.

SECTION 2614. Any article resembling butter in appearance and not made wholly, salt and coloring excepted, from the milk of cows, shall be imitation butter within the meaning of this chapter. The words "butter," "dairy," or creamery," shall form neither the whole nor a part of the name of any imitation butter, nor appear upon any article, or upon any box, tub, or package containing imitation butter.

SEC. 2615. No person, by himself or his agents or servants, shall render or manufacture, sell, offer for sale, expose for sale, take orders for the future delivery of, or have in his possession with intent to sell, any article, product, or compound made wholly or partly out of any fat, oil, or oleaginous substance or compound thereof, not produced from unadulterated milk or cream from the same, which shall be in imitation of yellow butter produced from pure unadulterated milk or cream of the same; *provided*, that nothing in this act shall be construed to prohibit the manufacture or sale of oleomargarine in a separate and distinct form and in such manner as will advise the consumer of its real character, free from coloration or any ingredient that causes it to look like butter. No imitation butter shall be sold or exposed for sale or delivered, except under the following conditions: First, the seller shall maintain in plain sight, over or next the main outer entrance of the premises where the selling is done, a sign bearing in plain, black Roman letters, not less than two inches wide and four inches long, on a white ground, the words "sold here," preceded by the name of the imitation article. If the selling is done from a wagon or other vehicle, such vehicle shall conspicuously bear upon its outside, on both sides of such wagon or vehicle, such a sign. If the delivering is done from a wagon or other vehicle, such vehicle shall conspicuously bear upon its outside on both sides of said wagon or vehicle a sign bearing in plain, black, Roman letters, not less than two inches wide and four inches long, on a white ground, the words, "delivered here," preceded by the name of the imitation article, Second, all imitation butter shall be kept in an enclosing package, which shall bear on the outside of its body, and also of its cover, at all times in plain sight of a beholder of the package, in black, Roman letters, not less than one inch wide and two inches long, on a white

or light-colored ground, the name of the imitation article. Third, the seller shall orally inform each buyer at each sale that the article he buys is not butter, and shall give the buyer the name of the imitation article. Fourth, every person, co-partnership, or corporation selling or offering for sale any imitation butter, and every keeper of a hotel, boarding-house, or restaurant, temporary or permanent, who shall furnish any guest with any imitation butter, or food containing it, shall within fifteen days after the passage of this act, or within fifteen days after commencing said business, and annually on the first day of May, or within fifteen days thereafter, register in a book kept by the Dairy Commissioner for that purpose the name and the town, street, and number of street, of the place of business of said person, co-partnership, corporation, keeper of a hotel, boarding-house, or restaurant. All signs prescribed in sections 2615, 2616, and 2617 of the general statutes shall be provided by the Dairy Commissioner, and all signs required, under provisions of section 2615 of the general statutes, to be maintained in plain sight over or next the main outer entrance of the premises where the selling is done, shall be placed in position under the direction of the Dairy Commissioner or his deputy. All signs so furnished by the Dairy Commissioner shall be paid for by the parties receiving the same, the same to be furnished at the actual cost thereof.

SEC. 2616. No baker or vender of food shall sell or expose for sale any article of food containing imitation butter unless such baker or vender shall maintain the same kind of a sign as hereinbefore first prescribed, in the way and manner prescribed in that connection, except that the word "used" shall be substituted for the word "sold." If the selling be done from a wagon, or other vehicle, such vehicle shall conspicuously bear such a sign.

SEC. 2617. No keeper of a hotel, boarding-house, or restaurant, temporary or permanent, shall furnish any guest with any imitation butter, or food containing it, unless such keeper shall maintain in plain sight of all guests sitting at tables where food is served such a sign or signs as hereinbefore prescribed, except that the word "used" shall be substituted for the word "sold."

SEC. 2618. The Governor shall appoint a citizen of the State as a Dairy Commissioner, who shall hold office for two years from and after the first day of May succeeding his appointment, and until his successor is appointed, unless sooner removed by the Governor for cause; and in case of his death, resignation, or removal the Governor shall fill the vacancy. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this chapter throughout the State. A room in the Capitol shall be set apart for the Dairy Commissioner. He may appoint and remove a deputy, who may also act as clerk. The Dairy Commissioner and his deputy shall have free access, at all reasonable hours, for the purpose of examining into any suspected violation of this chapter, to all places and premises, apartments of

private families, keeping no boarder excepted, where the Dairy Commissioner or his deputy suspects imitation butter to be made, sold, used, kept, or stored in transit, and on tender of the market price of good butter for the same may take from any person, firm, or corporation samples of any articles suspected to be imitation butter. And it shall be the duty of agents of railroad and express companies having knowledge or record of any consignment of imitation butter to inform the Commissioner or his deputy of such consignment, and the name of the consignee, when requested by said Commissioner or his deputy. The Dairy Commissioner may have samples suspected to be imitation butter analyzed at the Connecticut Experiment Station, or by any State Chemist, and a sworn or affirmed certificate after analysis shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed. Any one refusing the Dairy Commissioner or his deputy access in a reasonable manner, and at a reasonable time, to premises for said purpose of examination, or refusing to sell samples as hereinbefore provided for, shall incur the penalty hereinafter first provided for violations of this chapter. The Dairy Commissioner shall make an annual report to the Governor, and such annual report shall be submitted to the general assembly at its regular session.

SEC. 2619. Any person violating any of the provisions of sections 2614, 2615, or 2616, and any person, except a boarding-house keeper, violating section 2617 shall for the first offense be fined not more than one hundred dollars or imprisoned not more than sixty days, or both; for any subsequent offense said fine and imprisonment shall be doubled. Any boarding-house keeper violating section 2617 shall for the first offense be fined twenty-five dollars or imprisoned not exceeding thirty days, or both; for any subsequent offense said fine and imprisonment last mentioned shall be doubled. Evidence of any violation of this chapter shall be *prima facie* evidence of willful violation with knowledge.

Approved, May 18, 1893, March 28, 1895.

OLEOMARGARINE.

In 1886, when the first oleomargarine law was passed in the State of Connecticut, there were large quantities of this product sold all through the State, and it was displacing a very large amount of good, pure dairy or creamery butter. Statistics show that the amount sold at that time in the State was about 2,656,854 pounds. Oleomargarine was also manufactured in this State. In 1889 one firm in New Haven produced 1,000,000 pounds, 890,000 of which were sold in the United States. In 1888, after the law had been in operation two years, the amount sold was reduced to 800,000 pounds. Since that time, with the more

complete law to which attention has already been called, the amount sold has been reduced to a much lower figure. We are unable from any data which we can get, to state the exact amount which has been sold in the State during the last year. The largest quantity comes from Providence, R. I. As this is so near the border of our State it is very easy to ship it to customers here. Careful examination has been made in all parts of the State, and every opportunity improved to gather information in regard to the amount used, and how it has been sold. The evidence shows that several thousand pounds were shipped from the factories in Providence, and also that quite a large amount came from manufactories in the West. There are six licensed dealers now in the State, same number as last year. Most of these are selling in accordance with our State law, have the signs posted, and all requirements complied with; but when the price of butter advances as cool weather comes on, there is great inducement to sell this manufactured product for pure yellow butter. This is largely carried on by peddlers or grocery men, who carry it in their delivery wagons, with no signs displayed, and nothing to show what the article really is.

The methods of getting information in regard to the selling of oleomargarine have been to inspect stores in all parts of the State, delivery wagons, and peddlers' wagons, examine the butter which we find, and if it is at all suspicious, samples have been taken. These samples were then further tested by the melting process and by the microscope. If these tests prove that the article is pure butter nothing further is done in regard to it. But in many cases we were not satisfied, and then samples were sent to the Experiment Station at New Haven.

In sending samples for analysis the same rules are observed in all cases. The following form is used in taking samples, and a book is prepared in which the record can be kept.

Sample of..... No.....
Procured at.....
Date procured..... 189.....
Name of Dealer.....
Name of Mfr.....
Date sent Analyst..... 189.....
How sent.....
Amount paid for sample..... $.....
Remarks.....
Result of analysis.....

A label is put upon the samples sent to the Chemist, giving the No., date, and by whom sent; no further information is given, so that he knows nothing about where it was taken, or from whom. If found to be a pure article, returns in accordance are made; if found to be adulterated, or under the above law found to be oleomargarine, a sworn statement is made by the Vice Director of the Station to that effect.

It was found last spring that quite a large quantity of oleomargarine, proved by the tests as above stated, was being sold in the City of Hartford by parties who brought it into the city and sold it to families and stores for good yellow butter. After the parties were located, prosecution was made, and they were convicted.

Three prosecutions were made in the City of New Haven of parties who were selling oleomargarine without signs displayed at their place of business or on their wagons, and had not registered in the office of the Dairy Commissioner as dealers in oleomargarine. They were convicted.

A party in New Haven was keeping a large boarding-house, without signs displayed or complying with the law in any respect. They were prosecuted and fined twenty-five dollars and costs.

During the winter a large quantity of oleomargarine was sold in the City of Waterbury, some of it was shipped to places just out of the city, and taken from there by teams and sold.

There was also a large amount shipped to the city. At one time about one thousand pounds was found there ready for delivery. In endeavoring to locate the parties to whom it was shipped a careful watch was kept upon it, but the parties learning that it was watched never dared to come after it, and in about a week orders came from Providence to ship it back to the factory. There is every evidence the coming winter, as the price of butter advances, that the manufacturers of oleomargarine will again attempt to ship a goodly quantity of this product in among our people, and many of our citizens may be defrauded by it. We have a good law now in our State, all that is required under it is that oleomargarine shall be sold for just what it is, and not to be sold in imitation of yellow butter. It is satisfactory to those dealers who wish to sell good, straight, pure butter, and under its careful and thorough administration consumers who desire to use dairy or creamery butter are protected from the fraud of having a spurious manufactured article sold to them.

As was stated in the report of last year, many of the States are very much in earnest in enacting and carrying out laws to protect their citizens from the sale of oleomargarine and butterine as butter. They think it is a fraud, and as such should be fought constantly and vigorously. These States have taken no backward steps during the last year, but are more determined than ever that all food products should be sold for just what they are, that all imitation articles should be sold upon their own merits, and not that of the real product.

The following interesting statements in regard to the manufacture and sale of oleomargarine are taken from the last report of the United States Commissioner of Internal Revenue:

OLEOMARGARINE.

By permission we reprint from Internal Revenue Report, 1897:

The following statements, showing operations under the act of August 2, 1886, defining butter and imposing a tax upon and regulating the manufacture, sale, importation, and exportation of oleomargarine, comprise:—

First. A summary of operations at oleomargarine manufactories during the fiscal year ended June 30, 1897; also a summary of operations during the past two fiscal years, and by months covering the period from November 1, 1886, to June 30, 1897.

Second. A statement of the receipts from all classes of taxes imposed by the oleomargarine law for the year ended June 30, 1897.

Third. A statement, by States and Territories, showing the number or establishments for which special tax was paid to carry on, during the fiscal year ended June 30, 1897, the business of manufacturing and dealing in oleomargarine; also, in aggregate, of all persons who paid oleomargarine special taxes for the twelve months ended June 30, 1896.

Fourth. A statement of the total production and of total receipts from all oleomargarine sources for each fiscal year since the oleomargarine law took effect.

It appears from the subjoined table that the average monthly production of oleomargarine under the operations of the law has been as follows:

	Pounds.
During the eight months ended June 30, 1887	2,711,828
During the fiscal year ended June 30—	
1888	2,860,460
1889	2,972,002
1890	2,693,669
1891	3,699,367
1892	4,030,346
1893	5,602,024
1894	5,801,853
1895	4,746,508
1896	4,237,769
1897	3,794,267

It also appears that the average monthly quantity withdrawn from factories on payment of the tax was as follows:

	Pounds.
During the eight months ended June 30, 1887	2,592,946
During the fiscal year ended June 30—	
1888	2,707,430
1889	2,821,970
1890	2,566,494
1891	3,601,292
1892	3,909,625
1893	5,371,989
1894	5,508,004
1895	4,469,686
1896	3,978,482
1897	3,541,636

The average quantity withdrawn monthly for exportation during the same time is shown to have been as follows:

	Pounds.
During the eight months ended June 30, 1887	90,566
During the fiscal year ended June 30—	
1888	140,516
1889	145,746
1890	134,866
1891	102,426
1892	107,981
1893	232,124
1894	283,890
1895	278,123
1896	258,850
1897	262,367

In the fiscal years 1887 and 1888 the largest production month was March; in the fiscal year 1889, December; in the fiscal year 1890, October; in the fiscal year 1891, March; in the fiscal year 1892, March; in the fiscal year 1893, January; in the fiscal year 1894, October; in the fiscal year 1895, October; in the fiscal year 1896, October; while the greatest production during the fiscal year ended June 30, 1897, occurred in March. The quantity produced during these months was as follows:

	Pounds.
In March, 1887	3,568,254
In March, 1888	3,940,727
In December, 1888	4,181,317
In October, 1889	4,072,333
In March, 1891	6,723,224
In March, 1892	5,916,871
In January, 1893	7,824,657
In October, 1893	9,318,006
In October, 1894	7,046,429
In October, 1895	5,922,649
In March, 1897	4,826,677

The months in which the production fell below 2,000,000 pounds were as follows:

	Pounds.
During the fiscal year ended June 30, 1887:	
May, 1887, produced	1,885,027
June, 1887, produced	1,375,423
During the fiscal year ended June 30, 1888:	
July, 1887, produced	1,208,638
During the fiscal year ended June 30, 1889:	
June, 1889, produced	1,575,362
During the fiscal year ended June 30, 1890:	
July, 1889, produced	1,404,749
August, 1889, produced	1,975,773
May, 1890, produced	1,864,746
June, 1890, produced	1,364,826
During the fiscal year ended June 30, 1891:	
July, 1890, produced	1,723,966
June, 1891, produced	1,988,633

There was a decrease in the number of persons engaged in the sale of oleomargarine during the fiscal year ended June 30, 1897, as well as a decrease in the production of the article.

The following table shows the quantity of oleomargarine, in pounds, at 2 cents tax, produced at manufactories during the

fiscal year ended June 30, 1897, the quantity withdrawn during the year, and the stock of oleomargarine remaining in factories June 30, 1897:

SUMMARY OF OPERATIONS AT OLEOMARGARINE MANUFACTORIES DURING THE FISCAL YEAR ENDED JUNE 30, 1897.

	Pounds.
Stock on hand July 1, 1896	396,404
Removed for export and remaining unaccounted for July 1, 1896	330,062
Produced during the year	45,531,207
Total	46 257,673

Oleomargarine withdrawn from factories tax-paid	42,499,634
Oleomargarine lost or destroyed in manufactories	3,645
Withdrawn from manufactories for export and accounted for by clearance certificates filed	3,233,746
Withdrawn from manufactories for export and accounted for by payment of tax on account of certificates not filed,	1,565
Oleomargarine transferred from First District of Illinois to Sixth District of Indiana at close of fiscal year	43,858
Understatement of withdrawals	4,319
Removed for export not accounted for June 30, 1897	243,158
Remaining in factories June 30, 1897	227,748
Total	46,257,673

OPERATIONS IN OLEOMARGARINE DURING THE LAST TWO FISCAL YEARS.

The following statements, by districts, show the quantity, in pounds, of oleomargarine produced at manufactories, the quantity withdrawn therefrom tax-paid for export, and the quantity lost or destroyed at manufactories during the two fiscal years ended June 30, 1896, and June 30, 1897, respectively; also the stock remaining on hand at the close of each year:

From July 1, 1895, to June 30, 1896.

DISTRICT.	Produced.	Withdrawn tax-paid.	Withdrawn for export.	Lost or destroyed.	Remaining in factory June 30, 1896.
Connecticut, *a*	8,644,860	6,396,020	2,236,585	.....	29,840
First Illinois	29,172.122	28,591,110	584,876	2,090	238,790
Sixth Indiana	621,455	620.017	.....	.....	4,665
Kansas. *b*	5,936,533	5,826,112	99,343	40	71,123
Sixth Missouri	688,487	700,963	.....	.....	32,907
Nebraska, *c*	1,611,240	1,609,040	1,900	300	.....
Fifth New Jersey	67,224	62,014	2,850	.....	2,360
Eleventh Ohio	2,190,753	2,195 686	.....	.....	3,955
Eighteenth Ohio	1,743,535	1,736,266	.....	.....	12,764
First Pennsylvania	177,025	4,565	180,650	.....	.....
Total	50,853,234	47,741,793	3,106,204	2,430	396,404

a Including the State of Rhode Island. No oleomargarine was manufactured in the State of Connecticut.

b Including the Indian Territory and the Territory of Oklahoma; but no oleomargarine was manufactured in either of these Territories.

c Including the States of North Dakota and South Dakota; but no oleomargarine was manufactured in either of these States.

From July 1, 1896, to June 30, 1897.

DISTRICT.	Produced.	Withdrawn tax-paid.	Withdrawn for export.	Lost or destroyed.	Remaining in factory June 30, 1897.
Connecticut, *a*	7,112,433	5,026 683	2,074,686	.....	40,904
First Illinois	25,700,900	24,963,741	878,354	.....	53,677
Sixth Indiana	1,291,588	1,286,313	.....	.....	9,415
Kansas, *b*	5,589,363	5,396.063	162,341	.....	98,592
Sixth Missouri	346,372	378,639	.....	.....	640
Fifth New Jersey	261,871	219,080	33,026	3,645	8,480
Eleventh Ohio	3,452,314	3,452,165	.....	.....	3,860
Eighteenth Ohio	1,776,366	1,776,950	.....	.....	12,180
Total	45,531,207	42,499,634	3,148,407	3,645	227,748

a Including the State of Rhode Island. No oleomargarine was manufactured in the State of Connecticut.

b Including the Indian Territory and the Territory of Oklahoma; but no oleomargarine was manufactured in either of these Territories.

QUANTITY OF OLEOMARGARINE PRODUCED.

Statement showing the quantity of Oleomargarine produced, withdrawn tax-paid, for export, for exposition purposes, and lost or destroyed in manufactories monthly, from November 1, 1886, to June 30, 1897.

Months.	Quantity returned to factories.	Quantity produced.	Withdrawn tax-paid.	Withdrawn for export.	Lost or destroyed.	Withdrawn for exposition purposes.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
On hand November 1, 1886		181,090				
November		3,188,261	2,986,241	6,747	10,878	
December		3,073,263	2,956,827	67,189	296	
1887.						
January		2,804,096	2,720,235	144,535	3,056	
February		2,779,855	2,716,759	60,500	9,182	
March		3,568,254	3,512 138	96,499	12,472	
April		2,839,358	2,780,307	149,838	6,866	
May		1,885.027	1,769,954	136,523	2,210	
June		1,375,423	1,311,108	62,701	6,267	
July		1,208,638	1,170,136	33,240	1,191	
August		2,425,226	2,296,238	110,990	601	
September		2,703,256	2,568,007	68 917	262	
October		3,082,935	2,915,016	92,201	1,979	
November		3,003,715	2,862,321	148,899		
December		3,256,028	3,120,393	78,500		
1888.						
January		3,058,955	2,918,868	117,781		
February		3,057,149	3,003,515	126 168		
March		3,940,727	3,824,672	155,761	2,998	
April		3,273,453	3,062,396	251,994	1,537	
May		3,185,127	2,817,292	327,726		
June		2,130,318	1,930,311	174,021	995	
July		2,084,317	1,925,762	155,200	185	
August		2,301,769	2,209,782	153,285	727	
September		2,776,465	2,611,693	167,787		
October		3,462,123	3,368,418	80,785		
November		3,734,878	3,509,408	175,965		
December		4,181,317	4,025,336	109,385	10	

QUANTITY OF OLEOMARGARINE PRODUCED.—*Continued.*

Months.	Quantity returned to factories.	Quantity produced	Withdrawn tax-paid.	Withdrawn for export.	Lost or destroyed.	Withdrawn for exposition purposes.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1889.						
January		3,607,753	3,353,350	137,123		
February		3,523,381	3,266,245	228,191	1,000	
March		3,047,875	3,077,831	70,424		
April		3,057,841	2,886,481	285,948		
May		2,310,945	2,114,678	126,223	70	
June		1,575,362	1,514,658	58,579		
July		1,404,749	1,442,094	95,580		
August		1,975,733	1,914,016	49,222	4,973	
September		2,274,456	2,130,648	167,826		
October		4,072,333	3,668,057	190,385	688	
November		3,188,757	3,174,648	121,630		
December		3,072,028	3,010,319	93,770		
1890.						
January		3,338,340	3,053,375	117,900	3,692	
February		3,011,670	3,042,219	104,018	256	
March		3,885,080	3,657,614	213,680		
April		2,871,274	2,719,725	159,119		
May		1,864,746	1,795,963	219,052		
June		1,364,826	1,189,257	86,215	90	
July		1,723,966	1,573,786	157,808		
August		2,320,548	2,135,414	192,175	56	
September		3,391,817	3,139,816	146,920		
October		3,626,055	3,482,124	95,660	3,356	
November		3,615,704	3,615,132	71,400		
December		4,373,447	4,238,578	21,090		

1891.						
January		3,664,473	3,702,844	36,158		
February		4,386,152	4,349,304	46,330		
March		6,723,224	6,577,926	62,170		
April		4,573,178	4,443,605	288,966	1,039	
May		4,005,212	3,907,827	39,994		
June		1,988,633	2,049,156	70,445		
July		2,524,287	2,428,144	38,970		
August		2,376,022	2,276,339	104,008		
September		3,560,418	3,435,513	45,050		
October		4,941,276	4,825,731	71,998	112	
November		4,975,162	4,813,457	91,860		
December		4,593,610	4,570,557	68,775		
1892.						
January		4,777,319	4,563,758	83,306		
February		4,864,932	4,607,287	218,570		
March		5,916,871	5,711,766	189,090		
April		4,607,392	4,711,950	122,593		
May		3,160,611	2,935,407	134,198		
June		2,067,255	2,035,592	127,364		
July		2,653,622	2,388,926	284,558		
August		3,745,521	3,571,333	144,870		
September		5,116,208	4,698,580	145,853		
October		5,195,351	5,239,316	219,263		
November		7,311,563	6,707,850	229,732		
December		6,541,521	6,202,957	283,058		
1893.						
January		7,824,657	7,686,836	223,053		
February		6,383,115	6,068,662	233,048	4,525	
March		6,358,576	6,249,313	239,106	3,828	
April		6,378,648	6,253,313	305,957	1,939	
May		6,242,756	5,860,198	264,392		1,214
June		3,472,760	3,536,591	212,604		
July		3,653,387	3,350,268	233,894	1,506	
August		5,014,242	4,716,712	222,354		
September		7,126,593	6,739,234	220,283		228
October	228	9,318,006	8,731,547	265,147	228	
November	450	7,401,265	7,280,926	302,468	450	
December		6,809,238	6,577,978	177,320		

QUANTITY OF OLEOMARGARINE PRODUCED.— *Continued.*

Months.	Quantity returned to factories.	Quantity produced.	Withdrawn tax-paid.	Withdrawn for export.	Lost or destroyed.	Withdrawn for exposition purposes.
1894.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
January		6,566,191	6,215,278	255,889		
February		6,243,843	6,127,589	287,461	643	
March		5,889,497	5,639,414	415,549	61	
April		5,413,302	4,956,192	358,951		
May		3,633,891	3,443,917	328,171	2,691	
June		2,552,791	2,317,003	339,196		
July		3,028,980	2,695,799	257,784		
August		5,429,045	4,756,713	262,076		
September		5,928,516	5,862,883	317,141		100
October	100	7,046,429	6,616,097	338,673	100	
November		6,633,846	6,297,673	290,424		
December		5,075,604	4,834,587	242,503		
1895.						
January		5,030,335	4,900,591	244,102	4,029	
February		4,803,201	4,625,339	211,471		
March		4,318,972	4,021,562	359,255	19,458	
April		3,967,691	3,820,075	255,985		
May		3,295,660	3,012,370	267,166		
June		2,399,826	2,192,553	290,606	4,480	
July		3,003,913	2,669,369	301,633		
August		3,547,363	3,240,923	275,950		
September		3,887,134	3,820,689	155,593	300	
October		5,922,649	5,357,691	330,129		
November		5,266,905	4,995,014	318,798		
December		5,436,286	5,033,087	205,319	1,760	

1896.						
January		4,830,851	4,735,497	228,860	40	
February		4,501,881	4,355,331	204,327		
March		4,962,718	4,642,891	293,626		
April		3,741,993	3,630,624	247,033		
May		2,929,162	2,697,332	241,231		
June		2,822,379	2,563,345	303,705	330	
July		2,610,739	2,405,071	164,289		
August		2,647,753	2,495,435	233,653		
September		3,478,137	3,257,578	186,149		
October		4,734,809	4,208,662	312,218	1,135	
November		3,662,184	3 455,106	324,844		
December		4,740,937	4,424,367	361,287	650	
1897.						
January		4,240,212	4,030,944	175,770	180	
February		4,171,130	3,742,250	387,528		
March		4,826,677	4,604,195	290,970		
April		4,323,737	4,085,153	197,073		
May		3,494,183	3,308,871	249,618		
June		2,600,709	2,482 002 *b* 4,319	265,008	1,680	*a* 43,858
Total	778	506,953,866	482,467,245	24,087,194	127,057	45,400
On hand June 30, 1897						227,748

a This quantity was transferred from First District of Illinois to Sixth District of Indiana at close of fiscal year 1897.

b Understatement of withdrawals.

OLEOMARGARINE RECEIPTS.

RECEIPTS UNDER THE OLEOMARGARINE LAW DURING THE FISCAL YEAR ENDED JUNE 30, 1897.

DISTRICTS.	Collections on Oleomargarine at 2 cents per pound.	SPECIAL TAXES OF—			Total.
		Manufacturers.	Retail Dealers.	Wholesale Dealers.	
Alabama			$432 00	$1,360 00	$1,792 00
Arkansas			888 00	480 00	1,368 00
First California					
Fourth California, *a*					
Colorado, *b*			1,624 00	680 00	2,304 00
Connecticut, *c*	$101 737 68	$600 00	14,375 10	2,720 00	119,432 78
Florida			2,772 00	2,240 00	5,012 00
Georgia			616 00	2,320 00	2,936 00
First Illinois	494,959 42	2,400 00	33,146 00	2,680 00	533,185 42
Fifth Illinois			1,096 00	480 00	1,576 00
Eighth Illinois			1,536 00		1,536 00
Thirteenth Illinois			949 00	800 00	1,749 00
Sixth Indiana	26,276 70	600 00	3,382 00	1,600 00	31,858 70
Seventh Indiana			1,200 00		1,200 00
Third Iowa					
Fourth Iowa					
Kansas, *d*	110,665 14	1,200 00	2,348 00		114,213 14
Second Kentucky			162 00		162 00
Fifth Kentucky			1,876 00		1,876 00
Sixth Kentucky			1,568 00	480 00	2,048 00
Seventh Kentucky			314 00		314 00
Eighth Kentucky					
Louisiana, *e*			3,380 00	1,840 00	5,220 00
Maryland, *f*			3,852 00	1,760 00	5,612 00
Massachusetts			1,108 00		1,108 00
First Michigan			7,392 00	1,800 00	9,192 00
Fourth Michigan			1,040 00	400 00	1,440 00

Minnesota				480 00	480 00
First Missouri			2,024 00		2,024 00
Sixth Missouri	7 638 00	600 00	676 00		8,914 00
Montana, *g*			48 00		48 00
Nebraska, *h*	10 80		942 00		952 80
New Hampshire, *i*			284 00		284 00
First New Jersey			606 00	2,280 00	2,886 00
Fifth New Jersey	4,410 20	600 00	5,462 00	1,440 00	11,912 20
New Mexico, *k*			276 00	480 00	756 00
First New York			154 00		154 00
Second New York			120 00	800 00	920 00
Third New York	36 00		204 00		240 00
Fourteenth New York			60 00		60 00
Twenty-first New York					
Twenty-eighth New York					
Fourth North Carolina			48 00		48 00
Fifth North Carolina			120 00		120 00
First Ohio			5,652 00	1,440 00	7,092 00
Tenth Ohio			266 00	120 00	386 00
Eleventh Ohio	69,005 96	600 00	2,260 00		71,865 96
Eighteenth Ohio	35,693 98	600 00	6,014 00	480 00	42,787 98
Oregon, *l*			318 00		318 00
First Pennsylvania	257 30		1,018 00		1,275 30

a Including the State of Nevada.
b Including the State of Wyoming.
c Including the State of Rhode Island.
d Including the Indian Territory and the Territory of Oklohoma.
e Including the State of Mississippi.
f Including the State of Delaware, District of Columbia, and two counties of Virginia.
g Including the States of Idaho and Utah.
h Including the States of North Dakota and South Dakota.
i Including the States of Maine and Vermont.
k Including the Territory of Arizona.
l Including the State of Washington and the Territory of Alaska.

OLEOMARGARINE RECEIPTS.— *Continued.*

DISTRICTS.	Collections on Oleomargarine at 2 cents per pound.	SPECIAL TAXES OF—			Total.
		Manufacturers.	Retail Dealers.	Wholesale Dealers.	
Ninth Pennsylvania			$168 00		$168 00
Twelfth Pennsylvania			320 00		320 00
Twenty-third Pennsylvania			9,284 00	$3,600 00	12,884 00
South Carolina			316 00	480 00	796 00
Second Tennessee			96 00		96 00
Fifth Tennessee			920 00	960 00	1,880 00
Third Texas			1,552 00	3,840 00	5,392 00
Fourth Texas			574 00	1,320 00	1,894 00
Second Virginia			2,142 00	1,680 00	3,822 00
Sixth Virginia			378 32		378 32
West Virginia			2,368 00	2,220 00	4,588 00
First Wisconsin			376 00		376 00
Second Wisconsin			236 00	2,640 00	2,876 00
Total	$850,691 18	$7,200 00	$130,338 42	$45,900 00	$1,034,129 60

NUMBER OF OLEOMARGARINE ESTABLISHMENTS.

Statement, by States and Territories, showing number of establishments for which special tax was paid to carry on, during the fiscal year ended June 30, 1897, the business and manufacturing and dealing in oleomargarine.

States and Territories.	Manufactories.	Wholesale Establishments.	Retail Establishments.	Total.	States and Territories.	Manufactories.	Wholesale Establishments.	Retail Establishments.	Total.
Alabama	..	3	10	13	Nevada	..	..	..	..
Alaska	..	..	..	..	New Hampshire	..	..	5	5
Arizona	..	..	2	2	New Jersey	1	7	167	175
Arkansas	..	1	26	27	New Mexico	..	..	5	5
California	..	..	..	..	New York	..	2	14	16
Colorado	..	2	44	46	North Carolina	..	..	4	4
Connecticut	..	..	11	11	North Dakata	..	..	2	2
Delaware	..	..	8	8	Ohio	2	6	394	402
Dist. of Columbia	..	2	63	65	Oklahoma	..	..	..	..
Florida	..	4	88	92	Oregon	..	..	..	..
Georgia	..	4	15	19	Pennsylvania	..	9	283	292
Idaho	..	..	..	..	Rhode Island	3	5	315	323
Illinois	6	12	1,065	1,083	South Carolina	..	3	9	12
Indiana	1	4	121	126	South Dakota	..	..	..	..
Indian Territory	..	..	10	10	Tennessee	..	1	27	28
Iowa	..	..	..	..	Texas	..	10	45	55
Kansas	2	..	57	59	Utah	..	..	..	..
Kentucky	..	1	104	105	Vermont	..	..	..	..
Louisiana	..	4	79	83	Virginia	..	3	69	72
Maine	..	..	4	4	Washington	..	..	9	9
Maryland	..	2	30	32	West Virginia	..	4	71	75
Massachusetts	..	2	29	31	Wisconsin	..	5	17	22
Michigan	..	6	235	241	Wyoming	..	..	..	..
Minnesota	..	1	..	1					
Mississippi	..	..	5	5	Total for 12 months ended June 30, '97,	16	*a* 103	3,539	3,658
Missouri	1	..	74	75	Total for 12 months ended June 30, '96,	22	*b* 157	4,380	4,559
Montana	..	..	1	1					
Nebraska	..	..	22	22					

a The number of wholesale establishments that actually carried on business after paying the special tax was 103.

b The number of wholesale establishments that actually carried on business after paying the special tax for the fiscal year ended June 30, 1896, was 157.

OLEOMARGARINE PRODUCED AND RECEIPTS SINCE 1886.

The following table of production and total receipts from all oleomargarine sources for each fiscal year since November 1, 1886, the date the oleomargarine law took effect, is interesting as showing the operations in the country:

	Produced. (Pounds.)	Receipts.
On hand November 1, 1886	181,090	
During the fiscal year ended June 30—		
1887 (from November 1, 1886)	21,513,537	$723,948.04
1888	34,325,527	864,139.88
1889	35,664,026	894,247.91
1890	32,324,032	786,291.72
1891	44,392,409	1,077,924.14
1892	48,364,155	1,266,326.00
1893	67,224,298	1,670,643.50
1894	69,622,246	1,723,479.90
1895	56,958,105	1,409,211.18
1896	50,853,234	1,219,432.46
1897	45,531,207	1,034,129.60
Total	506,953,866	$12,669,774.33

SUMMARY OF OPERATIONS.

The following is a summary of operations at oleomargarine factories in the several collection districts of the United States during the month of June, 1897; also the balances from the previous month are shown, and the balances at the close of the month.

DISTRICTS.	Stock on hand June 1, 1897.	Exported and unaccounted for June 1, 1897.	Quantity produced this month.	Quantity withdrawn tax-paid.	Quantity withdrawn for export.
Connecticut	53,953	127,254	468,473	337,709	143,818
First Illinois	234,389	49,055	1,344,446	*a* 1,421,558	93,600
Sixth Indiana	15,745	.....	87,892	94,222	.....
Kansas	95,092	16,300	333,633	*b* 307,093	23,040
Sixth Missouri	184	.....	37,692	37,236	.....
Fifth New Jersey	5,495	5,600	30,165	*c* 22,630	4,550
Eleventh Ohio	4,669	.....	182,337	183,146	.....
Eighteenth Ohio,	10,360	.....	126,066	124,246	.....
Total	419,887	198,209	2,600,709	2,527,840	265,008

a This quantity contains 43,858 pounds transferred to Hammond, Ind.
b This quantity contains 300 pounds, understatements of withdrawals.
c This quantity contains 1,680 pounds lost or destroyed in factory.

SUMMARY OF OPERATIONS.— *Continued.*

DISTRICTS.	Exported in this and previous months and accounted for this month.	Exported in this and previous months and unaccounted for at close of this month.	Stock on hand at close of this month.
Connecticut	135,905	135,168	40,904
First Illinois	*a* 62,955	79,700	53,677
Sixth Indiana	.....	.....	9,415
Kansas	12,550	26,790	98,592
Sixth Missouri	.....	.....	640
Fifth New Jersey	8,650	1,500	8,480
Eleventh Ohio	.....	.....	3,860
Eighteenth Ohio	.....	.....	12,180
Total	220,059	243,158	227,748

a This quantity contains 300 pounds tax-paid on account of certificate not filed.

DAIRY STATISTICS.

The most reliable statistics give Connecticut the following figures as representing our dairy products:

Number of cows	138,930
Gallons of milk produced on farms	54,413,822
Pounds of butter made on farms	7,196,095
Pounds of butter made in creameries	3,173,164
Pounds of cheese made on farms in 1890	112,566
Pounds of cheese made in creameries in 1890	195,955

For the purpose of comparison, the following figures referring to periods of ten years each, since and including 1850, are interesting.

YEAR.	Cows.	Pounds of Butter.	Pounds of Cheese.	Gallons of Milk per Cow.
1850	85,461	6,498,119	5,363,277	301.3
1860	98,877	7,620,912	3,898,414	277.2
1870	98,889	6,716,007	2,262,894	290.9
1880	116,319	8,418,906	1,051,677	325.4
1890	127,892	10,369,259	308,521	425.4
1898	138,930	.....	.....	.....

During the same period of fifty years the number of cows to each one thousand of population as been as follows:

1850	230	1880	187
1860	216	1890	171
1870	184		

The number of Connecticut cows, compared with those of the United States, is shown by the fact that in Connecticut there were in 1890, 121 cows to each 1,000 of population, while in the United States the proportion was 264 to each 1,000 of population. Similar statistics for the United States give the following figures:

Number of cows	16,511,950
Gallons of milk produced on farms	5,209,125,567
Pounds of butter made on farms	1,024,233,464
Pounds of butter made in creameries	181,284,916
Pounds of cheese made on farms	18,726,818
Pounds of cheese made in creameries	238,035,065

For the United States the number of cows has varied as follows:

1850	6,385,094	1880	12,443,120
1860	8,585,735	1890	16,511,950
1870	8,935,332		

As represented in the products of the creameries and other statistics relating to them, we have the following figures:

Number of creameries in the United States	4,712
Pounds of butter made in creameries	181,284,916
Pounds of cheese made in creameries	238,035,065
Pounds of condensed milk	37,926 821
Amount of capital employed	$16,016,573
Number of employes	14,921
Wages paid out annually	$5,390,705
Cost of materials used	$51,364,574
Value of products made	$62,686,043

The decrease in the amount of cheese made on farms is shown by the following figures:

1850	105,535,893	1880	27,272,489
1860	103,663,927	1890	18,726,818
1870	53,492,153		

The product of butter per capita in the United States may be stated as follows:

	Per capita.		Per capita.
1850	13.51	1880	16.08
1860	14.62	1890	19.24
1870	13.33		

During the period under consideration the average value of the cows in the United States is as follows:

1850	$20.02	1880	$23.27
1860	30.82	1890	22.13
1870	39.11		

NUMBER AND VALUE OF MILCH COWS.

The following table shows the number of milch cows, average price, and total value in each State, the year 1898:

STATE.	Milch Cows.	Average Price.	Total Value.
Maine	195,919	$27.55	$5,397,568
New Hampshire	132,840	29.65	3,938,706
Vermont	266,276	27.25	7,256,021
Massachusetts	174,554	32.80	5,725,371
Rhode Island	25,258	34.00	858,772
Connecticut	138,930	32.75	4,549,958
New York	1,402,164	32.00	44,869,248
New Jersey	208,421	36.10	7,523,998
Pennsylvania	928,905	29.60	27,495,588
Delaware	35,554	26.00	924,404
Maryland	151,982	25.60	3,890,739
Virginia	252 512	20.55	5,189,122
North Carolina	258,607	14.70	3,801,523
South Carolina	130,682	16.25	2,123,582
Georgia	303,392	21.85	6,629,115
Florida	117,785	19.50	2,296 808
Alabama	296,194	12.50	3,702,425
Mississippi	267,657	14.85	3,974,706
Louisiana	138,184	16.70	2,307,673
Texas	722,476	20.00	14,449,520
Arkansas	223,645	16.10	3,600,684
Tennessee	279,863	18.50	5,177,466
West Virginia	167,240	25.05	4,189.362
Kentucky	264,051	22.15	5,848,730
Ohio	729,441	29.35	21,409,093
Michigan	454,561	30.85	14,023,207
Indiana	605,916	29.20	17,692.747
Illinois	1,003,218	32.85	32,955,711
Wisconsin	814.384	28.70	23,372,821
Minnesota	633,933	27.50	17,434,808
Iowa	1,214,345	31.95	38,798,323
Missouri	666,530	26.75	17,434,808
Kansas	654,286	29.15	19,072,437
Nebraska	571,591	30.65	17,519,264
South Dakota	341.579	28.10	9,598,370
North Dakota	167,719	27.35	4,587,115
Montana	42,713	31.30	1,336,917
Wyoming	17,960	31.85	572,026
Colorado	85,669	32.50	2,784,242
New Mexico	19,126	26.55	507.795
Arizona	18,222	26.25	478,328
Utah	55,564	23.95	1,330,758
Nevada	18,105	27.85	504,224
Idaho	29,167	25.50	743,758
Washington	120.297	25.85	3,109,677
Oregon	115,427	23.30	2,689,449
California	342,392	28 65	9,808,531
Oklahoma	35,590	26 20	932,458
	15,840,886	$27.45	$434,813,826

CONNECTICUT CREAMERY ASSOCIATION.

The following is the Constitution of the Connecticut Creamery Association, with the officers for the present year:

President—E. R. Russell, Suffield.
Vice-President—Hiram Carter, Plainville.
Sec. and Treas.—Frank Avery, Wapping.

DIRECTORS.

B. F. Case, Canton.
E. D. Hammond, Cromwell.
H. P. Deming, Robertsville.
E. B. Little, Somers.
C. P. Reynolds, Jewett City.
D. E. Phelps, Windsor.
Francis Deming, Berlin.
John Brown, Merrow.

CONSTITUTION.

This Association shall be known as THE CONNECTICUT CREAMERY ASSOCIATION.

ARTICLE I.

Membership.

Any Creamery organization or individual engaged in the manufacture of butter may become a member of this Association upon the payment of two dollars ($2.00) and subscribing to the Constitution and By-Laws.

ARTICLE II.

The officers of this Association shall consist of a President, Vice-President, Secretary and Treasurer, and eight Directors, to be elected by ballot. The President, Vice-President, and Secretary and Treasurer to be also members of the Board of Directors.

ARTICLE III.

The annual meeting of this Association shall be held on the second Wednesday of January, 1893, at which meeting the election of the officers shall be held. Notices of all meetings of this Association shall be mailed to each member.

BY-LAWS.

ARTICLE I.

Section 1. The regular meeting of the Board of Directors shall be held quarterly; on the second Wednesday of January and on the third Wednesday of April, July, and October.

Sec. 2. Not less than five (5) members of the Board of Directors shall constitute a quorum at any regular meeting for the transaction

of business, and a majority of those present shall decide all questions, including applications for membership.

ARTICLE II.

It shall be the duty of the Secretary to keep the minutes of the proceedings of each meeting of the Association and of the Board of Directors; he shall issue all notices of meetings, receive and refer to the Directors all applications for membership; he shall qualify himself to give any information upon topics and matters connected with the manufacture and sale of butter; he shall have the custody of the books, records, and other property of the Association, and for his services shall receive such compensation as may be voted by the Directors; he shall also receive all fees and dues for membership, hold the custody of all moneys, and shall keep a correct account of all funds of the Association, and shall only pay out said moneys upon bills bearing the approval of the President.

ARTICLE III.

There shall be an Auditing Committee of two members of the Association, who shall be appointed by the President, who shall audit the accounts of the Secretary and Treasurer, and report to the Association at their annual meeting.

ARTICLE IV.

A special meeting may be called by the Secretary whenever in the judgment of the President and Secretary it may seem necessary, giving each director five days' notice.

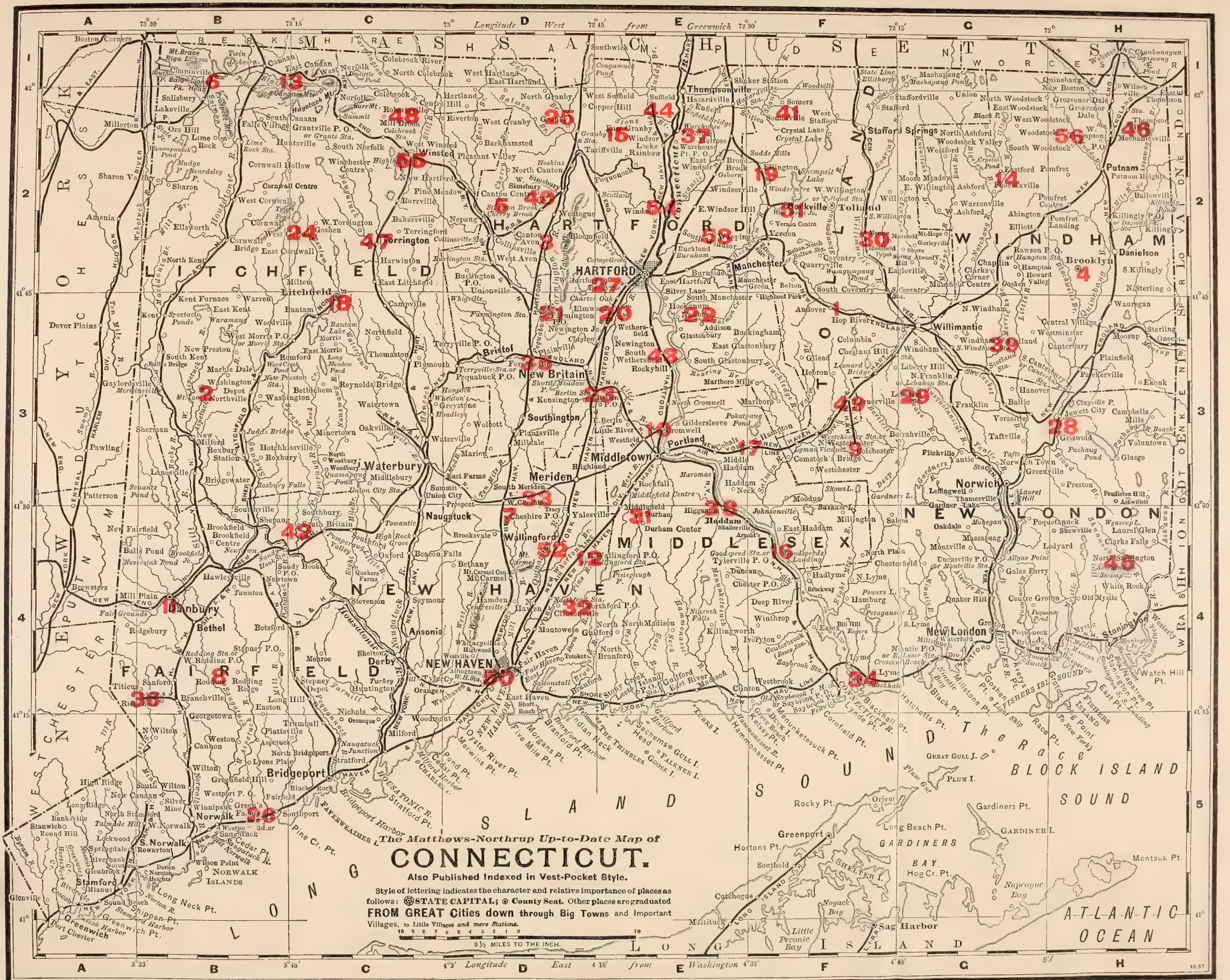
MANAGEMENT OF THE CREAMERIES OF THE STATE.

The managers of the creameries of the State have courteously given me statistics in regard to their work during the last year, which enables me to present the following tabulary statement in regard to their business for the year. The map given will show the locations of these creameries.

	Name.	Satuation.	Co-operative or Proprietary.	Amount of Capital.
1	Andover,	Andover,	Co-operative,	$4,000
2	Aspetuck,	Northville,	Co-operative,	1,500
3	Avon,	Avon,	Co-operative,	4,000
4	Brooklyn,	Brooklyn,	Co-operative.	
5	Canton,	Canton Center,	Co-operative,	3,675
6	Chapinville,	Chapinville,	Proprietary,	
7	Cheshire,	Cheshire,	Proprietary,	2,000
8	Clover Farms,	Redding.		
9	Colchester,	Colchester,	Co-operative,	3,750
10	Cromwell,	Cromwell,	Co-operative,	3,500
11	Danbury,	Danbury,	Proprietary,	3,000
12	Durham,	East Wallingford,	Co-operative,	2,000

	Name.	Situation.	Co-operative or Proprietary.	Amount of Capital.
13	East Canaan,	East Canaan,	Co-operative,	$3,500
14	Eastford,	Eastford,	Co-operative,	2,975
15	East Granby,	East Granby,	Co-operative,	3,000
16	East Haddam,	Goodspeeds,	Co-operative,	3,950
17	East Hampton,	East Hampton,	Discontinued.	
18	Echo Farm,	Litchfield,	Proprietary,	100,000
19	Ellington,	Ellington,	Co-operative,	4,850
20	Elmwood,	Elmwood,	Private.	
21	Farmington,	Farmington,	Co-operative,	3,975
22	Glastonbury,	Glastonbury,	Co-operative,	3,700
23	Golden Ridge,	Berlin,	Co-operative,	3,000
24	*Goshen,	West Goshen,	Co-operative,	3,000
25	Granby,	Granby,	Co-operative,	3,550
26	Green's Farm Ass'n,	Green's Farm,	Co-operative.	
27	Highland,	West Hartford,	Co-operative,	3,200
28	Jewett City,	Jewett City,	Co-operative,	4,000
29	Lebanon,	Lebanon,	Co-operative,	3,400
30	Mansfield,	Merrow,	Co-operative,	3,600
31	Mountain Spring,	Durham,	Proprietary.	
32	Northford,	Northford,	Proprietary,	2,800
33	Oak Shade,	Cheshire,	Proprietary,	2,000
34	Old Lyme,	Black Hall,	Proprietary,	3,000
35	Plainville,	Plainville,	Co-operative,	4,000
36	Ridgefield,	Ridgefield.		
37	Riverside,	Warehouse Point,	Co-operative,	4,000
38	Riverside Jersey,	Higganum,	Private.	
39	Scotland,	Scotland,	Co-operative,	1,800
40	Simsbury,	West Simsbury,	Co-operative,	3,000
41	Somers,	Somers,	Co-operative,	4,500
42	South Britain,	South Britain,	Proprietary.	
43	Spring Brook,	South Wethersfield,	Co-operative,	3,000
44	Suffield,	Suffield,	Co-operative,	5,500
45	Taugwank,	North Stonington,	Co-operative,	3,000
46	Thompson,	Thompson,	Proprietary,	900
47	Torrington,	Torrington,	Proprietary,	2,500
48	Tunxis,	Robertsville,	Co-operative,	2,500
49	Turnerville,	Turnerville,	Private.	
50	Valley Farm,	New Haven,	Proprietary,	20,000
51	Vernon,	Rockville,	Co-operative,	3,675
52	Wallingford,	Wallingford,	Co-operative,	4,400
53	Wapping,	Wapping,	Co-operative,	3,500
54	Windsor,	Windsor,	Co-operative,	7,000
55	Winsted,	Winsted,	Proprietary,	2,000
56	Woodstock,	Woodstock,	Co-operative,	3,000

* See page 39.


The Matthews-Northrup Up-to-Date Map of
CONNECTICUT.
Also Published Indexed in Vest-Pocket Style.
Style of lettering indicates the character and relative importance of places as follows: STATE CAPITAL; County Seat. Other places are graduated FROM GREAT Cities down through Big Towns and Important Villages, to Little Villages and mere Stations.
8½ MILES TO THE INCH.
Longitude West from Greenwich
Longitude East from Washington
LITCHFIELD
HARTFORD
TOLLAND
WINDHAM
NEW LONDON
MIDDLESEX
NEW HAVEN
FAIRFIELD
Waterbury
New Britain
Middletown
Meriden
Willimantic
Norwich
Danbury
Bridgeport
Norwalk
Stamford
New London
Putnam
Manchester
Torrington
Thompsonville
Stafford Springs
Naugatuck
Wallingford
Southington
Bristol
Derby
Ansonia
Milford
Greenwich
Long Island Sound
The Race
Block Island Sound
Gardiners Bay
Atlantic Ocean
Long Island
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2 President, L. T. Peel; Secretary and Manager, W. B. Hatch.
3 President, C. R. Woodford; Secretary, Treasurer and Manager, H. M. Lyman.
4
5 President, E. N. White; Secretary, Treasurer and Manager, B. F. Case.
6 Proprietors, Robert and Herbert Scoville; Manager, L. P. Ashman.
7 President, E. A. Atwater; Secretary and Treasurer, Edgar Beadle; Superintendent, Edward Shinners.
8
9 President, J. E. Hall; Vice-President, T. S. Rathburn; Secretary, S. E. Williams; Treasurer, D. C. Gillette; Superintendent, W. P. Adams.
10 President, Henry Gilbert; Secretary, Treasurer and Superintendent, E. B. Hammond.
11 Directors, Jeremiah Mead, H. N. Judd, L. H. Boughton.
12 President, W. I. Parmelee; First Vice-President, W. L. Davis; Second Vice-President, J. D. Bartholomew; Superintendent, J. D. Bartholomew.
13 President, C. H. Sage; Secretary, Treasurer and Manager, E. S. Roberts.
14 President, S. O. Bowen; Secretary and Treasurer, C. M. Jones.
15
16 President, S. B. Warner; Treasurer and Superintendent, L. M. Stark.
17 Discontinued.
18 President, John S. Palmer; Secretary and Treasurer, A. B. Webster.
19 President and Superintendent, John Thompson; Secretary and Treasurer, J. T. McKnight.
20
21 President, C. Deming; Secretary and Treasurer, A. R. Wadsworth.
22 President, E. H. Andrews; Secretary and Treasurer, H. E. Loomis; Manager, Henry Moseley.
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25 President, Geo. O. Beach; Superintendent and Treasurer, H. J. Dewey; Secretary, S. F. Holcombe.
26 President, J. H. Jennings; Secretary, W. H. Burr.
27 President, Frank Sisson; Treasurer, Morgan Goodwin; Secretary and Superintendent, Timothy Sedgwick.

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* See page 39.

28 President, Simon Brewster; Secretary and Treasurer, F. E. Olds.
29 President, A. G. Kneeland; Secretary and Treasurer, S. W. Stark; Superintendent, N. Manning.
30 President, J. R. Hall; Superintendent, John Brown.
31 President, H. Page.
32 President, Geo. W. Cook; Secretary, D. M. Foot; Treasurer, T. A. Smith.
33
34 Superintendent, D. E. Turner; Proprietor, Nathan Griswold.
35 President, A. Corbin; Secretary, Treasurer and Superintendent, Hiram Carter.
36
37 President, C. T. Abbee; Secretary and Treasurer, Horace Patten.
38
39 President, R. T. Haskins; Vice-President, J. Anthony; Secretary, W. G. Anthony; Superintendent, E. B. Inman.
40 President, W. M. Case; Secretary, S. T. Stockwell; Treasurer, Albert R. Shepard; Superintendent, S. T. Stockwell.
41 President, M. P. Avery; Superintendent, E. B. Little; Treasurer, W. P. Fuller.
42
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44 President, E. A. Russell.
45 President, Chas. Maine; Superintendent, B. P. Wheeler; Secretary, W. H. Hillard.
46 Proprietor, L. A. Logee.
47 President, G. C. Ives.
48 President, A. B. Ferry; Superintendent, H. P. Deming.
49 President, etc., P. W. Turner & Co.
50 L. G. Hemingway.
51 President, A. P. Thrall; Secretary and Treasurer, M. C. Annis; Superintendent, A. W. Annis.
52 P. J. Boland.
53 President, Oliver Clark; Secretary, C. J. Dewey; Superintendent, Frank Avery.
54 President, D. Ellsworth Phelps; Secretary and Treasurer, I. N. Hayden.
55 President, etc., E. Manchester & Sons.
56 President, Abel Child; Secretary, G. H. Sumner; Treasurer, L. A. Cutten; Superintendent, Abel Child.

	Average amount of Surplus Butter.	Kind of Churn Used.	Is a Separator used? If so, what Make?
1	None.	Square Box.	No.
2		Box Churn.	National.
3	None.	Square Churn.	No.
4			

	Average amount of Surplus Butter.	Kind of Churn Used.	Is a Separator used? If so, what Make?
5	Very Little.	Square Box.	No. Are Patrons.
6	300 pounds.	Square Box.	No.
7	None.	Davis Swing.	No.
8			
9	10,000 pounds.	Square Box.	No.
10	None.	Swing Churn.	No.
11	None.	Square Churn.	Empire.
12	None.	Dasher Churn.	De Laval.
13	None.	Vt. Farm Matchless, Revolving.	No.
14	None.	Square Box.	No.
15	None.	Square Box, Fargo Butter Worker, Swing.	De Laval.
16	None.	Revolving Churn.	No.
17	Discontinued.		
18	None.	Revolving Churn.	United States.
19	None.	Revolving Churn.	No.
20	None.		No.
21	500 pounds.	Blanchard Cylindrical.	No.
22	None.		No.
23	None.	Box Churn.	De Laval.
24	*Small amount.	Square Box Churn.	No.
25	None.	Vt. Farm Square Box Churn.	No.
26	None.	Davis Swing.	No.
27	None.	Square Box Revolving.	No.
28	None.	Box Churn.	No.
29	None.	Box Swing.	No.
30	None.	Davis Swing.	No.
31	None.	Davis Swing.	De Laval.
32	None.		De Laval.
33		Barrel Churn.	No.
34		Davis Swing.	No.
35		Box Churn.	No.
36	None.	Square Box.	De Laval.
37	None.	Moseley & Stoddard.	
38		Barrel Davis Swing.	
39	None.	Swing Churn.	No.
40	None.	Square Box.	No.
41	None.	Davis Swing.	Sharples.
42	None.	Box Churn	De Laval Alpha.
43	None.	Swing Churn.	No.
44	None.	Square Box Revolving.	De Laval.
45	None.	Swing Churn.	

* See Page 39.

	Average amount of Surplus Butter.	Kind of Churn Used.	Is a Separator used? If so, what Make?
46	None.	Davis Swing.	No.
47	None.	Square Box.	No.
48	6,000 pounds.	Vt. Farm Machine Co. Square Box.	No.
49	None.	Stoddard.	De Laval.
50	None.	Blanchard Swing.	Russian Imperial.
51	Small amount.	Davis Swing.	No.
52	None.	Davis Swing.	No.
53		Davis Swing.	No.
54		Box Churn.	No.
55	None.	Barrel, (Surprise.)	No.
56	Small amount.	Davis Swing.	No.

Number.	No. spaces Cream Rec'd in 1897	No. lbs. Cream Rec'd in 1897.	No. lbs. Butter made in 1897.	Rec'd for Butter per lb. Average Price.	Aggregate Amount paid Patrons.
1		481,220	108,014		
2			147,531	$0.16	
3			4,215	.22	
4					
5					
6					
7			16,311	.25	$ 5,119 00
8					
9		412,574	89,427	.21	15,110 07
10		280,478.3	62,314	.24	10,954 49
11			16,000	.25	
12				.24	
13	545,319		98,222	.21 41-100	16,716 75
14		154,570	29,499		3,987 62
15					
16		223,000	53,300	.23 1-2	9,500 00
17	Discontinued.				
18					
19	473,864	455,316	176,290	.23 7-10	33,00 000
20					
21			49,485		
22	442,310		65,863	.22 89-100	11,646 69
23			67,000	.23	13,040
24*					
25		853,081	206,261	.21	34,500
26					
27	400,923		56,192	.27	10,961 00
28	478,284		68,602	.22 80-100	

* See Page 39.

Number.	No. spaces Cream Rec'd in 1897.	No. lbs. Cream Rec'd in 1897.	No. lbs. Butter made in 1897.	Rec'd for Butter per lb. Average Price.	Aggregate Amount Paid Patrons.
29		1,480,877	313,861		$58,425 14
30		79,826.52	96,000	$0.23 1-2	
31			8,000	.25	
32					
33				.25	
34		50,075			
35	407,538			.22 92-100	13,715 98
36		127,340	30,500	.24 1-2	5,650 00
37	495,828		79,554	.23	13,997 56
38			5,000	.30	
39	345,973		48,973	.22 68-100	8,680 73
40	536,292		81,314		15,664 52
41		380,000	83,000	.25	17,000 00
42					
43		191,419	40,912	.23	7,360 95
44		619,323	135,546	.22 8-10	25,011 34
45				.22	6,234 43
46	305,600		47,358	.23	8,404 00
47		637,083	138,628	.23	25,063 94
48		556,417	125,408	.21 1-2	21,300 00
49			18,692	.25	
50				.28	
51		225,268	51,370	.22 2-5	9,159 73
52					
53		843,160	185,397	.19 42-100	36,009 13
54		506,579	112,587		20,381 43
55					
56					

No.	No. of Hands Employed.	Value of Plant.	When Organized.	What System.	No. of Patrons.	No. of Cows.
1	1	$4,000	Jan. 31, 1887.	Babcock Test.	92	
2	2	2,000	1889.	Babcock Test.	115	200
3	1	2,000	1875.	Curtis Oil Test.	40	200
4						
5		4,000	1879.	Babcock Test.	90	700
6	2		1888.	Babcock Test.	17	500
7	3	1,200	1875.		12	105
8						
9	1	3,000	1886.	Babcock Test.	75	650
10		3,500	1887.	Babcock Test.	59	300
11	4		1895.	Babcock Test.	8	190
12	2	1,800		Babcock Test.	30	280
13	1	3,500	Dec. 16, 1895.		59	500
14	1		1888.	Babcock Test.	43	200

No.	No. of Hands Employed.	Value of Plant.	When Organized.	What System.	No. of Patrons.	No. of Cows.
15		3,000	1882.	Babcock Test.	38	300
16	1	3,950	May, 1888.	Babcock Test.	50	350
17	Discontinued.					
18			1881.	Gravity.		
19	2	4,850	1884.	Babcock Test.	102	850
20						
21	1	2,000	1870.	Babcock Test.	33	300
22			1886.	Babcock Test.	54	
23	1	2,500	1890.	Babcock Test.	40	
24*	2	3,500	1883.	Babcock Test.	48	
25	3	3,000	1882.	Babcock Test.	160	
26		2,000	1890.	Oil Test.		
27	1	3,800	1877.	Cooley.	16	
28	1				50	
29	3	1,200	1887.	Babcock Test.	165	
30	1	2,000	1886.	Babcock Test.	95	
31	1					35
32	3		1885.	Babcock Test.	20	200
33	1	1,000	1882.		120	500
34	1	3,000	1889.	Babcock Test.	9	90
35	1	4,000	1882.		44	325
36	2	2,000	1889.	Babcock Test.	33	150
37	1	5,000	1888.		54	300
38	1		1888.			18
39	3	1,800	1888.	Babcock Test.	36	200
40	2	5,000	1883.	Babcock Test.	50	500
41	2	4,500	1888.	Babcock Test.	67	700
42		4,500	1894.	Babcock Test.	50	600
43	2	2,350	1885.	Babcock Test.	26	250
44	2	6,000	1888.	Babcock Test.	95	900
45	1	3,000	1889.	Babcock Test.	31	365
46	1	250			30	176
47	2	4,000		Babcock Test.	81	
48	1	2,500	1889.	Babcock Test.	100	750
49	1	4,000	1892.	Babcock Test.		111
50	12	20,000	1885.	Babcock Test.	45	
51	1	3,675	1889.	Babcock Test.	37	
52		5,000	1887.	Cooley.	8	140
53	2	2,500	1883.	Babcock Test.	100	900
54	2	7,000	1885.	Babcock Test.	72	450
55		2,000	1880.	Deep Setting.	1	70
56		3,000	1888.		30	200

* See Page 39.

* THE GOSHEN CREAMERY CO.

	No. Pounds Cream Received in 1897.	AMOUNT OF BUTTER MADE IN—					
		1893.	1894.	1895.	1896.	1897.	1898.
January...	11,249	4,421	3,460	3,273	2,657	2,410	3,346
February..	10,173	4,516	3,699	3,469	2,795	2,174	3,107
March.....	18,165	5,954	5,964	6,008	4,059	3,847	5,112
April.....	29,302	6,596	6,636	6,494	5,251	6,260	7,428
May.....	47,228	8,983	10,363	8,974	6,303	10,321	10,586
June.....	51,500	10,595	10,137	9,994	8,204	11,417	13,968
July.....	48,601	10,097	8,456	9,371	8,220	10,973	12,266
August.....	43,872	7,884	6,458	8,056	7,478	9,781	10,212
September.	42,196	6,930	5,154	6,474	8,267	9,293	.....
October....	38,260	6,286	4,646	4,950	7,441	8,183	.....
November.	25,728	3,940	3,548	2,776	5,568	5,276	.....
December..	19,101	3,385	3,332	2,626	3,245	3,961	.....

	Amount Paid Patrons in 1897.	Butter per Pound Net.	Fat per Pound Net.
January.....	$462.81	$0.19 2-10	$0.23 45-100
February.....	465.41	.21 4-10	.25 4-100
March.....	781.31	.20 1-10	.23 156-1000
April.....	1,118.60	.17 424-1000	.20 251 1000
May.....	1,556.34	.14 76-100	.16 933-1000
June.....	1,659.21	.14 53-100	.16 12-100
July.....	1,694.60	.15 443-1000	.17 533-1000
August.....	1,625.65	.16 62-100	.18 789-1000
September.....	1,734.62	.18 665-1000	.20 347-1000
October.....	1,714.34	.20 95-100	.23 417-1000
November.....	1,139.06	.21 58-100	.25 8-100
December.....	843.33	.21 3-100	.24 58-100

The following cuts represent a few of the creameries of the State, together with a short account of their business. Want of space prevents me from giving a fuller account of all of them.

THE COLCHESTER CREAMERY.

The Colchester Creamery Co. was organized in August, 1876, with a capital stock of $2,500. The first Board of Directors were J. E. Hall, L. S. Rathburn, S. C. Gillette, D. S. Bigelow, D. C. Gillette, C. H. Norton, and Wm. P. Adams; the officers being, President, J. E. Hall; Vice-President, L. S. Rathburn; Secretary and Treasurer, C. H. Norton; Superintendent, D. S. Bigelow.

The creamery started business January 18, 1877, churning at first seventy pounds, the cream all raised by the "Cooley" system, and paid for by space.

The present Board of Directors are J. E. Hall, L. S. Rathburn, D. S. Bigelow, S. E. Williams, S. W. Carver, J. R. Backus, D. C. Gillette, H. Foote, and Wm. P. Adams. The officers to-day are: President; J. E. Hall, Vice-President, L. S. Rathburn; Secretary, S. E. Williams; Treasurer, D. C. Gillette; Superintendent, Wm. P. Adams.

The capital stock is increased to $3,750. The cream is still raised by the "Cooley" system, except for three patrons, who use separators.

THE ANDOVER CREAMERY.

ANDOVER CREAMERY.

An effort was made to organize a creamery in 1884; at that time there was no creamery east of the Connecticut River. Not enough people were interested in the project to subscribe the necessary stock, so not until three years later was the plan revived, and farmers in surrounding towns were invited to join in the enterprise, which was taken up with much zeal, and the necessary capital was raised.

The company was finally organized January 31, 1887. The stock was placed at $4,000. This was largely taken by farmers in the towns of Andover, Bolton, Columbia, Coventry, and Hebron; most of these afterwards became patrons of the creamery.

The first directors were R. E. Phelps, A. H. Lyman, C. B. Stearns, Geo. Curtis, S. B. West, T. E. Porter, and J. H. Jagger. The first officers were: President, R. E. Phelps; Secretary, M. P. Yoemans; Treasurer, C. F. Lincoln.

The creamery was built the following summer, and was open for business October 10, 1887. Mr. R. B. Fargo, from Plymouth, N. Y., was engaged as butter maker; he had then and still has the reputation of being one of the best butter makers in this country.

The Cooley cream gathering system was adopted and is still in use. Cream was measured and paid for by the space until May, 1896, when the Babcock test was introduced.

The creamery building is 30 x 48 feet, with a work room 19 x 30 feet, and is well equipped for doing a large business. It has a power worker and a revolving box churn holding 400 gallons. There are three cream routes of an average length of about twenty-five miles, and extending over five towns, with ninety patrons. Its product has brought into Andover and vicinity, so far, nearly a quarter of a million of dollars. The butter is always in demand at the highest market prices.

The present officers are: E. P. Skinner, President and Treasurer; M. P. Yoemans, Secretary; A. H. Lyman, Superintendent.

SUFFIELD CREAMERY.

To meet a demand which for some time had been manifesting itself among the farmers of Suffield, the Suffield Creamery Company was organized on June 5, 1888, by the election of the following board of officers: President and Superintendent, E. A. Russell; Secretary, George F. Kendall; Treasurer, W. W.

THE SUFFIELD CREAMERY.

Cooper; Directors, W. W. Cooper, H. K. Ford, C. C. Sheldon, J. F. Merrill, and D. S. Fuller.

Stock in the enterprise was very generally taken among the leading farmers and business men of the town and the capital, which was at first placed at $3,500, was subsequently raised to $5,500, at which figure it has since remained.

The first meeting of the new company was held on July 23d to take action for securing a site and for the construction of the necessary buildings. A very suitable and convenient site was soon selected a few rods from the railroad station on sloping ground near the street and also near a stream of water sufficiently large to receive and immediately dispose of the drainage. E. A. Russell and D. S. Fuller were appointed a committee to report on plans for a building; after a thorough investigation of other creameries, plans were drawn by E. A. Russell, and in accordance with them the building was constructed by W. W. Cooper, chairman of the building committee which further consisted of H. K. Ford and J. F. Merrill. Pains were taken to make the building a model of convenience, efficiency and durability, and the best appliances obtainable were secured. The main building is 34 x 54 feet in size and so constructed that the cream is received on the second floor on the west side, while the work rooms are on the ground floor below. The main work room is 20 x 40 feet facing the driveway on the east. Adjoining it on the south is a boiler room 12 x 20, a coal room 8 x 12, and a repair and tool room 4 x 12; on the west is the cream room 12 x 22, the floor of which is 3½ feet above the floor of the work room; on the northwest corner is the cooler, 8 x 12, and a packing room the same size connecting with it. On the second floor is a room for receiving the cream, another for storage and still another for a directors' room. The rest of the building is fitted for a tenement of ten rooms and a space also for extra storage on the third floor. The cost of the plant including site, engine, boiler and all equipments ready for use, and the ice house and shed in an adjoining building, was a little in excess of $6,000.

The patrons were at first supplied with Cooley creameries and the fixtures were from Vermont Farm Machine Company. The two Davis swing churns have now been superseded by one large revolving churn and the space system of payment has been discarded for the method of paying according to the butter fat supplied by each patron as ascertained by the Babcock test. This

system was introduced August 1st, 1894, and has given much better satisfaction than the old system and has tended to enhance the quality of the cream received.

The business of the new creamery was successful from the beginning and a ready market found at nearly all times for the product, which has commanded the best of prices. At the State fair held at Meriden in 1890, this creamery received the premium on creamery butter.* The product has first averaged about 12,000 pounds a month. About 50 per cent. of this is sold in Springfield and the remainder is mainly marketed in Suffield, Windsor Locks, Hartford, Meriden and New Haven. Most of the time the demand exceeds the supply. The creamery has a capacity for making a much larger amount of butter, and if it were not for the demand for milk in the north part of the town for the Springfield market, the output of the creamery would be nearly doubled. One effect of the business of the creamery has been to considerably increase the dairy resources of the town.

The present board of officers are: President, Arthur Sikes; Superintendent, E. A. Russell; Secretary and Treasurer, George F. Kendall; Directors, C. C. Sheldon, C. L. Austin, Arthur Sikes, E. J. Copley, and F. B. Hatheway. E. C. Stratton has had charge of the butter making from the beginning the business.

TUNXIS CREAMERY.

The Tunxis Creameary Association of Robertsville, Conn., was organized in March, 1889 with a capital stock of $2,000.

During the first two or three years the Association experienced some little difficulty, owing to the farmers withholding their patronage.

The first year the whole number of patrons was about thirty. For the past five years the number has been about one hundred.

The largest amount of butter made in any one year was 190,000 pounds, in 1894. Since the organization the Association has increased its capital stock to $2,500. Several improvements have been made to the real estate. A large ice house has been built, and the past summer a neat tenement for the butter-maker was added to the creamery building.

The Association deals quite largely in grain, buying in car load lots and selling to its patrons at a small advance above the wholesale rates, thereby saving many dollars each year to its patrons.

(*) and also the sweepstakes premium over all creamery and private dairy butter.

THE TUNXIS CREAMERY.

The management consists of a President, Secretary and Treasurer, and a Board of seven Directors. Meetings of the Board of Directors are held monthly.

The present Board is as follows: President, Arthur B. Ferry, Secretary and Treasurer, H. P. Deming; Directors, John A. Moore, Horace North, R. D. Wilson, O. E. Murphy, Orton B. French, Joshua Ferry and S. F. Roberts.

F. W. Moore is the efficient butter-maker.

For the past few years the average cost of gathering cream, making and marketing the butter, has been four and one-half cents per lb. butter.

ELLINGTON CREAMERY.

The Ellington Creamery Co. was organized in Feb., 1884, on the co-operative plan. The capital stock was at first $3,500, but was later raised to $4,850, when the tenement was built on to the front of the building, and other additions were made to the plant. The number of stockholders has kept about forty. The building is large and amply furnished with the latest machinery and accommodations for the care of the cream, and the manufacture and handling of the butter. Four large tempering vats are used to carry the stock of cream. The original swing churns have been replaced by revolving ones. A power worker is in opera-

THE ELLINGTON CREAMERY. (Fourteen Years of Successful Business).

tion, as needed, thus reducing the labor and cost of working the butter. The large refrigerator and store-room is directly connected with the work-room, and the ice house joins the main building in the rear. The product of the Ellington Creamery has always been of a superior quality, and has stood at the top of the market. Ellington creamery butter has been recognized by the trade—and the public in general—as the best, and it has stood the test of careful examination by expert judges in State and National contests.

The space system of counting and measuring the cream was followed until June, 1897, when the Babcock test was begun, and the payments since that time have been for butter fat found in the cream. The last payment made to patrons (for August cream,) being 27 cents per lb. butter fat.

The management of the creamery rests with a board of directors, five in number, who appoint a superintendent and manager. The present superintendent and President is Mr. John Thompson, he was preceded by Mr. A. M. Bancroft, who was manager for 10 years.

The Board of Directors now consists of John Thompson, President and Superintendent; H. H. McKnight, Otis Snow, Orson S. Wood, J. A. Thompson.

The office of Secretary and Treasurer has been filled by J. T. McKnight from the time of the first organization of the Company.

The following is a summary of the business from the commencement of mauufacture in July, 1884, to June 1st, 1897, (covering the time the space system was followed).

Total No. spaces cream gathered,	15,387,979
" " lbs. butter made, - -	2,411,605
" income, - - - - -	$671,190 00
" amount paid patrons, -	$559,201 00

Average expense (including every form of expense for the entire period of about 13 years,) 4 6-10 cents per lb. butter.

REPORT OF YEAR FROM JUNE 1ST, 1897, TO JUNE 1ST, 1898.

Total No. lbs. butter fat in cream, -	149,346
" " " " made, - -	179,251
Income for the year, - - -	$42,124 00
Amount paid patrons, - - -	$34,308 00

Average expense per lb. butter, 4 3-10 cents.

During the fourteen years ending July 1st, 1898, over 1,300 tons of butter has been made and sold; making the entire business amount to upwards of $717,000.

INSTRUCTION IN DAIRYING AT STORRS AGRICULTURAL COLLEGE.

The dairy industry of a State is fostered and developed through many agencies. The Agricultural Press, Station Bulletins, Farmers' Institutes, The Dairymen's Association have al had a hand in helping this industry. In many States a Dairy School has been a potent factor.

Two years ago the Trustees of Storrs Agricultural College appropriated money to build and equip a small dairy building, where instructions could be given in dairying. This building has been occupied two winters. The dairy-room is equipped with the latest machinery for handling milk and manufacturing butter. This apparatus has been selected with especial reference to illustration and instruction.

Different styles of separators, churns, butter workers, Babcock tests are used and compared under similar conditions.

The building is also furnished with a boiler and engine, which supply power, steam, hot water and steam heat.

INSTRUCTION IN REGULAR COLLEGE COURSE.

The regular student of the College takes up dairying during the Junior year. The course of instruction includes Stock-

Feeding, Dairy Bacteriology, Milk and its Products, Breeds and Breeding, besides the class-room work and lectures on the above subjects. The student spends 72 hours during the winter term at practical work in the dairy. Instruction and practice is given in operating the Babcock test, in operating and caring for the different styles and makes of separators, in comparison of separaters as to capacity and efficiency of skimming. Practice is

given in ripening cream for churning, testing cream for acidity, churning, coloring, salting, working, packing and preparing butter for market.

INSTRUCTION IN SHORT COURSE.

A short course of 12 weeks is given during the winter term. This course is designed to meet the wants of young men and women who expect to engage in dairying, and who feel the need of a better preparation before beginning their life work. There are many farmer's sons and daughters, who have not the means or time to take a regular college course. With others time is limited, and they desire to confine their attention to dairying strictly, rather than take up other lines.

To meet the wants of such young people, the short course in dairying is designed. The instruction covers the same ground

on dairy subjects that is gone over in the regular college course, but it is condensed and made as practical as possible.

No tuition is charged, and the expense of the course is very small. This opportunity is within the reach of any young man who will make the effort. The term this winter opens Jan. 3, 1899.

THE CONNECTICUT DAIRYMEN'S ASSOCIATION.

The Connecticut Dairymen's Association was incorporated by an act of the Legislature in 1889. It was organized several years before. This organization has been of great benefit to the dairy interests. The object of the Association is to improve the dairy and related interests. The officers of the Association are :

President, A. R. Wardsworth, Farmington.
Vice-President, W. B. Sprague, Andover.
Secretary, F. H. Stadtmueller, Elmwood.
Treasurer, W. I Bartholomew, Putnam.

DIRECTORS.

G. E. Manchester, West Winsted.
H. F. Miner, Vernon.
J. S. Kirkham, Newington.
J. B. Noble, East Windsor Hill.
R. B. Eno, Weatogue.
J. G. Schwink, Jr., Meriden.
Richard Davis, Middletown.
W. O. Seymour, Ridgefield.

Prominent dairymen from all parts of the State are members of this Association. An annual meeting is held every year. This continues for three days. Among the speakers are men prominent in dairy work from different parts of the country. In connection with this meeting there is a large exhibit of dairy products. These meetings are always of great interest to all concerned in dairying and there is a large attendance.

JERSEY CATTLE BREEDERS' ASSOCIATION.

Prominent breeders of fine Jersey cattle in the State several years ago formed the Jersey Cattle Breeders' Association. Following are its officers:

President, S. C. Colt, Elmwood.
Vice-President, M. W. Terrill, Middletown.
Secretary, R. A. Potter, Bristol.
Treasurer, B. C. Collins, Meriden.

Quarterly meetings of the Association are held the third Wednesdays in January, April, August, and October.

The following is a partial list of the Jersey Cattle Breeders of Connecticut:

D. D. Bishop, Cheshire.
Geo. A. Bowen, Woodstock.
J. C. Capen, Bloomfield.
J. H. Clemence, Bristol.
Cyrus Coe, Middlefield.
Samuel C. Colt, Elmwood.
John O. Couch, Middlefield.
Daniel F. Gulliver, Norwich.
E. Stevens Henry, Rockville.
Jas. P. Ingles, Middlefield.
F. B. Miller, Bloomfield.
Robert A. Potter, Bristol.
H. E. Savage, East Berlin.
M. W. Terrill, Middletown.
L. S. Wells, New Britain.
Wm. R. Goodspeed, East Haddam.
Chas. J. Johnson, Uncasville
Chas. H. Owen, Buckland.
Chas. I. Allen, Terryville.
A. N. Lane, Wolcott.
Evelyn Upson, Wolcott.
H. J. Lathrop, Suffield.
A. D. Vorce, Farmington.
Jas. Hart Welch, Forestville.
F. Cheney, Jr., So. Manchester.
H. M. Clark, New Britain.
Jas. Campbell, Rockville.
Edgar Brewer, Hockanum.
Oliver J. D. Hughes, Meriden.
Benj. Stark, New London.
A. L. Northrop, Ridgefield.
D. S. Dodge, Simsbury.
A. H. Austin, Gaylordsville.
S. Cadwell, East Glastonbury.
Fred'k P. Miles, Lakeville.
T. S. Gold, Cornwall.
Nathaniel Foot, Colchester.
B. F. Case, Canton.

Cornelius Andrews, New Britain.	M. N. Woodruff, Southington.
Fred'k Bronson, Greenfield Hills.	F. M. Lewis, "
B. W. Collins, Meriden.	B. T. Lewis, "
Edw. W. Hazen, Haddam.	Edwin H. Gillett, Burlington.
F. M. Jerome, New Britain.	W. E. Hotchkiss, "
Silas W. Robbins, Wethersfield.	Chas. Moins, Whigville.
Chas. L. Tuttle, Hartford.	D. E. Mills, "
A. L. Latimer, West Simsbury.	R. B. Eno, Weatogue.
Lyman A. Mills, Middlefield.	B. C. Bradley, South Britain.
Lewis F. Averill, Pomfret.	S. D. Newell, Bristol.
Thos Fairclough, Wolcott.	W. W. Cowles, Manchester.

CONSTITUTION AND BY-LAWS,

NATIONAL ASSOCIATION OF STATE DAIRY AND FOOD DEPARTMENTS.

ARTICLE I.

NAME.

This Association shall be known as THE NATIONAL ASSOCIATION OF STATE DAIRY AND FOOD DEPARTMENTS.

ARTICLE II.

OBJECT OF THE ASSOCIATION.

Section 1. The object is to promote and foster such legislation as will tend to protect public health and prevent deception in the manufacture, sale and use, of dairy food, and other products intended for human consumption.

Sec. 2. To promote uniformity in legislation and rulings relative to dairy and food products.

Sec. 3. To enhance the efficiency of dairy and food laws by developing an acquaintance tending to harmonize the interests represented by those charged with the enforcement of such State laws.

ARTICLE III.

OFFICERS.

The officers shall consist of one President, and Vice-Presidents as follows: First Vice-President, Second Vice-President and Third Vice-President, and a Secretary who shall also be the Treasurer; no two of whom shall reside in the same State.

ARTICLE IV.

COMMITTEES.

The Committee shall be as follows:

1. A Legislative and Executive Committee.
2. A Finance Committee
3. A Committee on Resolution.

ARTICLE V.

ELECTION OF OFFICERS.

All officers shall be elected by ballot, and shall hold office until the last session of the next annual meeting or until their successors are duly elected.

ARTICLE VI.

DUTIES OF OFFICERS.

Section 1. The President shall preside at all meetings and shall issue, or cause the Secretary to issue, all orders or notices that may be required, and shall notify, or cause to be notified, all members of the Association of any meeting that may be called in accordance with the rules and by-laws; and appoint such committees as may be required, whose appointment or election are not otherwise provided for.

Sec. 2. It shall be the duty of the Vice-Presidents in their numerical order to act in the capacity of President, when the President or preceding Vice-President is absent, or from any other cause fails to act, in accordance with the by-laws of the Association. Adopted.

Sec. 3. The Secretary shall keep a record of the proceedings of each meeting, and conduct such correspondence and issue such notices as may be required of him by these by-laws, or by the President, or acting President of this Association, by and with the advice and consent of the Legislative and Executive Committee. He shall, at least, thirty days prior to any meeting of this Association, ascertain whether the President is qualified and will be present to act as such. If the President cannot act, the Secretary shall notify the Vice-Presidents in their numerical order to be present and act as President of the meeting. He shall also have charge of all funds of the Association and pay the same upon orders of the President on bills which have been audited and allowed by the Executive Committee.

ARTICLE VII.

LEGISLATIVE AND EXECUTIVE COMMITTEES.

The Legislative and Executive Committee shall consist of five members. The President and Secretary shall be members of this Committee by virtue of their respective offices. The remaining three members shall be elected by ballot at each annual meeting, and shall serve until their successors are elected. The President of the Association shall be the Chairman of the Committee, and the Secretary of the Association shall be the Secretary of the Committee. Meetings of this Committee shall be held upon calls issued by the Chairman at the request of a majority of the Committee. Such calls shall state time, place and object of meeting, and shall give each member notice thereof at least fifteen days prior to the holding of the meeting.

ARTICLE VIII.

COMMITTEE ON FINANCE.

The Committee on Finance shall be composed of three members to be appointed by the President-elect at each annual meeting, and

shall hold office until such time as their successors are appointed. It shall be the duty of this Committee to devise and recommend ways to procure funds for the use of the Association and perform such other duties as may be required of them by the Association.

ARTICLE IX.

COMMITTEE ON RESOLUTIONS.

The Committee on Resolutions shall be composed of five members to be appointed by the President at the first session of each annual meeting, and shall hold office during such meeting.

ARTICLE X.

MEMBERSHIP.

Section 1. The following persons shall be members of this Association ex-officio: (1) State Dairy Commissioners, (2) State Dairy and Food Commissioners, (3) State Agricultural Commissioners charged by statute with the enforcement of dairy laws, (4) The Secretary or Executive officer of the State Agricultural Board which is charged by law with the enforcement of the Dairy or Food Laws.

Sec. 2. The following persons shall be eligible to membership, viz: the Deputies, Assistants, Secretaries, Inspectors and Agents, together with Attorneys, Chemists and other employes or attaches of the above named departments as may be recommended by the respective heads thereof; and in States having no such departments, a person appointed by the Governor of such State. All persons shall cease to be members of this Association when they cease to hold the position by virtue of which they are entitled to membership.

ARTICLE XI.

VOTING.

In voting by ballot or otherwise, each State shall be entitled to three votes. Those present and qualified may cast the full vote of their State.

ARTICLE XII.

AMENDMENTS.

These By-Laws may be amended at any regular meeting by a two-thirds vote of the States represented.

Under the rules the following were formally elected:

President, - - - -	J. E. Blackburn, Ohio.
First Vice-President, - -	G. L. Flaunders, New York.
Second Vice-President, - -	Levi Wells, Pennsylvania.
Third Vice-President, - -	J. B. Noble, Connecticut.
Secretary and Treasurer, -	Elliot O. Grosvenor, Michigan.

LEGISLATIVE AND EXECUTIVE COMMITTEE (ELECTIVE)

George M. Whittaker, Massachusetts. H. Brown Cannon, Colorado.
A. S. Mitchell, Wisconsin.

The President announced the appointment of the Finance Committee as follows :

FINANCE COMMITTEE.

H. B. Cannon, Colorado. R. O. Eaton, Connecticut.
H. C. Adams, Wisconsin.

AN ACT CONCERNING THE SELLING OF TUB BUTTER.

SECTION 1. No person by himself, or his agents or his servants, shall sell, offer for sale, or have in his possession with intent to sell, any butter known as "Tub Butter" which is pressed or printed into what is known as bricks, pats, or balls, except under the following conditions : Every such brick, pat, or ball shall have the words "Tub Butter" in one-half inch Roman letters, stamped or pressed upon it, and, if wrapped, the wrapper shall be marked in like manner. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this act throughout the State : and for this purpose the Commissioner and his deputy shall have free access at all reasonable hours to all places and premises where the Dairy Commissioner or his deputy suspects that any act in violation of this law has been or is being committed.

SEC. 2. Any person violating any provision of this act shall be fined not more than one hundred dollars.

Approved, May 5, 1897.

This law, which was passed at the last session of the Legislature, was fully explained in my last report, and the reasons given for the passage of such a law. The only object desired to be obtained, was : that the consuming public should not be deceived, and be led to believe that they were purchasing good Connecticut Creamery butter, when they were really getting cheap tub butter from the West, and thus a large amount of our home product be displaced. The operations under this law have been fairly satisfactory, most dealers readily complying with the law, and many of them commending it. In some cases it has led to the printing of butter out of the State, and bringing it here for sale. Of course under the law, the retail dealer would be liable, but the proof is very hard to obtain as we have no authority out of the State. A good deal of time has been expended in all parts of the State in carrying out the provisions of this law.

PROCESS BUTTER.

During the last two years large quantities of this butter has been put upon our market, and sold in nearly every city of this

State, all of it being shipped from other States. Several large manufactories have been built in the Middle and Western States for the manufacturing of this butter and it is likely in the future to become a large factor in the butter trade of this State. It is made from the poor and refuse butter, gathered from the stores and large dealers, when it is become in any way unfit for use. It is taken to the factory, put into large vats and melted. The butter fat is then drawn off and purified, skimmed milk is then added to it. It then passes into other large receptacles where it goes through a churning process, after which it somewhat resembles granulated butter. It is then worked and put up into prints for the market. As it is sold for a much lower price than good Creamery butter which it resembles in appearance, it commands quite a large sale. There has as yet no law been passed in any State in regard to this manufactured product, but many of the States will very probably take action in their coming legislation in regard to it.

THE CONSTITUTIONAL STATUS
OF THE
IMITATION BUTTER ACT OF CONNECTICUT.

BY WILLIAM E. SIMONDS.

Recent decisions of the United States Supreme Court have overthrown the oleomargarine laws of various States. In view of that fact it becomes interesting and important to inquire how those decisions affect the imitation butter act of Connecticut.

Our law does not assume to control the manufacture or importation of imitation butter. It defines imitation butter as "any article resembling butter in appearance and not made wholly, salt and coloring excepted, from the milk of cows." It provides that sellers of imitation butter shall inform the public of that fact by a suitable sign and shall also inform specific buyers orally; that packages of imitation butter shall be plainly marked as such; and that keepers of hotels, restaurants and boarding-houses who use imitation butter in the food which is served shall have a sign in plain sight disclosing that fact. The whole purpose and intent of the Connecticut law is to prevent deception, to prevent imitation butter from being sold or served

to the public as the genuine article. Under the Connecticut law one may make or sell or serve all the oleomargarine he chooses, provided he gives plain notice of the truth.

Under the decisions of the United States Supreme Court the State might go further if it chose to and suppress the manufacture of imitation butter within the State and the sale within the State of any butter so manufactured. That was settled in the case of *Powell vs. Pennsylvania*, 127 U. S., 678, of which decision the Supreme Court said in *Schollenberger vs. Pennsylvania*, 18 Supreme Court Reporter, 757:

"The article was manufactured and sold within the State and the question was one as to the police power of the State acting upon a subject always within its jurisdiction."

A very different sort of question arises when a State attempts to suppress the sale of oleomargarine or other imitation butter which is brought into that State from without. Then, says the Supreme Court, it becomes a proper article of interstate and international commerce, recognized as such by acts of Congress and a State may not interfere with the commerce upon which Congress has legislated, the prohibition against the State being contained in that clause of the Constitution of the United States which gives Congress power "to regulate commerce with foreign nations and among the several States and with the Indian tribes." In the case of *Schollenberger vs. Penn.*, just referred to, the U. S. Supreme Court reviews a class of facts relating to oleomargarine and concludes:

"Upon all these facts we think it apparent that oleomargarine has become a proper subject of commerce among the States and with foreign nations."

After saying this the Supreme Court proceeds immediately to lay down this rule regarding the importation of such an article into a State:

"The general rule to be deduced from the decisions of this Court is that a lawful article of commerce cannot be wholly excluded from importation into a State from another State where it was manufactured or grown. A State has power to regulate the introduction of any article including a food product so as to insure purity of the article imported, but such police power does not include the total exclusion even of an article of food."

Then naturally comes up the vital question as to how far the "police power" of the State may go in dealing with the imported article.

Upon that question the case of *Plumley vs. Massachusetts*, 155 U. S. 462, is very important. The following is what the Supreme Court said of that case in *Schollenberger vs. Penn.*, already referred to :

"The statute in that case prevented the sale of this substance in imitation of yellow butter produced from pure unadulterated milk, or cream of the same, and the statute contained a proviso that nothing therein should be 'construed to prohibit the manufacture or sale of oleomargarine in a separate or distinct form and in such manner as will advise the consumer of its real character, free from coloration or ingredients that cause it to look like butter.' This Court held that a conviction under that statute for having sold an article known as oleomargarine, not produced from unadulterated milk or cream, but manufactured in imitation of yellow butter produced from pure unadulterated milk or cream, was valid. Attention was called in the opinion to the fact that the statute did not prohibit the manufacture or sale of all oleomargarine, but only such as was colored in imitation of yellow butter produced from unadulterated milk or cream of such milk. If free from coloration or ingredient that caused it to look like butter, the right to sell it in a separate and distinct form, and in such manner as would advise the consumer of the real character, was neither restricted nor prohibited. The Court held that under the statute the party was only forbidden to practice in such matters a fraud upon the general public; that the statute seeks to suppress false pretenses and to promote fair dealings in the sale of an article of food, and that it compels the sale of oleomargarine for what it really is by preventing its sale for what it is not; that the term 'commerce among the States' did not mean a recognition of a right to practice a fraud upon the public in the sale of an article, even if it had become the subject of trade in different parts of the country. It was said that the Constitution of the United States did not take from the States the power of preventing deception and fraud in the sale within their respective limits of articles, in whatever State manufactured, and that that instrument did not secure to any one the privilege of committing a wrong against society.

"It will thus be seen that the case was based entirely upon the theory of the right of a State to prevent deception and fraud in the sale of any article, and that it was the fraud and deception contained in selling the article for what it was not, and in selling it so that it should appear to be another and a different article, that this right of the State was upheld."

Here the Supreme Court says that a State may prevent imitation butter from being colored to imitate the real article and it is

a decision of the highest practical importance. It does not, however, follow that a State may force oleomargarine to be given a specific color, different from its natural color, to distinguish it, as was attempted to be done by the State of New Hampshire. That State made a law that oleomargarine should be colored pink and in the case of *Collins vs. New Hampshire*, 18 Sup. Ct. Rep. 768, the U. S. Supreme Court nullifying that New Hampshire law as unconstitutional says:

"This statute, in its practical effect, is prohibitory. It is clear that it is not an inspection law in any sense. It provides for no inspection and it is apparent that none was intended. The act is a mere evasion of the direct prohibition contained in the Pennsylvania statute and yet, if enforced, the result, within the State would be quite as positive in the total suppression of the article as is the case with the Pennsylvania act."

Now how does all this effect the Connecticut law? The whole intent of our law is simply to prevent deception, to prevent imitation butter from being sold as real butter. And the Supreme Court clearly answers the question just put in the closing words of the quotation already given from *Schollenberger vs. Pennsylvania*, relating to the case of *Plumley vs. Massachusetts*, to wit:

"It will thus be seen that the case was based entirely upon the theory of the right of the State to prevent deception and fraud in the sale of any article and that it was the fraud and deception contained in selling the article for what it was not and in selling it so that it should appear to be another and a different article, that this right of the State was upheld."

Our present law is clearly constitutional. Moreover we can go further if we see fit. We have the power to prevent the manufacture of imitation butter within the State; we have the power to prevent the sale of imitation butter which is manufactured within the State. And we have the power to prevent imitation butter, wherever it is manufactured, from being colored to imitate the real article. It is for the Legislature, in its discretion, to determine whether we shall stop where we are.

The dairy interests of our State are of great importance. In my report of last year, short accounts were given of the herds and business of a few of the dairymen of the State. The following are along the same line, giving an account of other Dairymen of the State and their herds. These are given as was stated last year, with the hope that the interest in dairying and cattle breeding will be a growing one in the State.

RECORD OF THE STORRS AGRICULTURAL COLLEGE HERD

From Sept. 1, 1897, to Sept. 1, 1898.

No. of Cow.	Breed.	Yield of milk 1 year.	Yield of butter 1 year.	Average yield for breed.
1	Ayrshire	5,697	225	6,264 lbs. milk.
2	"	5,492	256	
3	"	7,604	343	275 lbs. butter.
4	Guernsey	3,782	231	4,861 lbs. milk.
5	"	5,428	303	
6	"	5,373	315	283 lbs. butter.
7	Grade	3,891	216	5,862 lbs. milk.
8	"	4,067	285	
9	"	5,228	278	334 lbs. butter.
10	"	6,356	326	
11	"	6,804	328	
12	"	5,285	340	
13	"	5,168	357	
14	"	6,093	357	
15	"	6,781	365	
16	"	6,955	376	
17	"	7,860	449	
18	Jersey	5,027	276	5,817 lbs. milk.
19	"	4,457	307	
20	"	5,217	344	361 lbs. butter.
21	"	8,567	516	
Average yield for herd,		5,767	323	

In studying the record of this herd, it must be born in mind that these cows are treated as individuals, and that we are not conducting a breed test. The number of animals is too small to warrant us drawing any conclusion from the record as to the best breed for butter or milk. But it is interesting to note that the good and poor cows are not confined to one breed. The five cows yielding the most butter in order of merit are, first, Jersey; second, third, forth and fifth are Grades.

The five cows yielding the most milk in order of merit are, first, Jersey ; second, Ayrshire ; third, fourth and fifth are Grades.

The five cows yielding the least butter, commencing with the smallest amount are, first, Grade ; second, Guernsey ; third and fourth, Ayrshire ; fifth, Jersey.

The five cows yielding the least milk, commencing with the smallest amount are, first, Guernsey ; second and third, Grade ; fourth and fifth, Jersey.

The Ayrshire on an average yielded the most milk and the least butter. The Grades yielded the most milk. The Jerseys made the most butter.

HERD OF E. G. SEELEY.

Mr. E. G. Seeley, of Roxbury, Conn., in the dairy business with his son, E. W. Seeley, is selling milk to the New York market. They have a herd of fifty to seventy-five cows, mostly thoroughbred Holsteins. They imported their foundation stock, and now raise their own calves to replenish the same. Mr. Seeley tried thoroughbred Jerseys and other grades, liking them very well, but no other grade has given the satisfaction, both in quality and quantity, as the Holsteins. In the summer the cows are turned to pasture and do not come into the stable until the frosty nights in the fall. In the winter they are turned out every day, unless very cold or frosty, that they may take fresh air and exercise. During the summer they are not fed any grain, but in the winter a variety of food is advocated ; hay, ensilage, provinder, wheat feeds of various kinds, and cotton seed meal or gluten meal are used, changing from one to the other frequently. Mr. Seeley raises his own corn for ensilage, also his hay, and averages about the same quantity of milk the year around. His experience has taught him that four things are indespensable to the success of the milk business, viz : good cows, good care, pure milk and kept sweet.

HERD OF A. B. PIERPONT.

The following cut is from the dairy herd of Mr. Pierpont. His farm is situated in East Waterbury, and his business is selling milk in the city. Mr. Pierpont started some fifteen years ago with a few native cows, but he soon changed to thoroughbred Holsteins, finding them the best for his use. He bought a

HERD OWNED BY A. B. PIERPONT.

thoroughbred sire from Mr. Stoddard, of Newington, also one fine cow from Smith & Powells, of Syracuse, and another one from Benj. F. Smith, of New York, the latter cow giving thirty-three measured quarts of milk a day. He has built up a fine herd which now numbers twenty-five, and is selling two hundred and fifty quarts of milk per day.

HILLSDALE FARM.

On the Hillsdale Farm, situate in Wapping, they have a herd of thirty cows, Mr. R. L. Sadd, manager.

An average of 225 quarts of milk is produced daily, and all of it is sold in East Hartford to families. The milk is aerated directly after coming from the cows, and all is bottled for delivery.

The milk is sold the entire year at the rate of six cents a quart. The herd is fed daily with ensilage and grain, not going to pasture during the year. Mr. Sadd sells a large crop of excellent hay from this farm yearly.

CLOVERDALE DAIRY.

The following is a sketch of the Cloverdale Dairy, owned by R. C. Wilcox & Sons, of Guilford, Conn.

The Cloverdale Dairy Farm originated about six years ago with four cows. The cream from the milk of those cows was sold to the Guilford Creamery for about five months, when it was

decided to make butter in a small way. The butter for the first year was sold for two cents below the wholesale creamery price, because the grocers could not pay the creamery prices. The last year nearly the entire make has been sold to families at thirty cents per pound the year around, and in fact it has been so the last four years. Mr. Wilcox is also now selling cream,

new milk, skim milk and buttermilk, one of his sons running a wagon daily in the town. He uses a De Laval cream separater which enables him to have sweet skim milk every day.

His herd consists of twenty-eight Jerseys and Grade Jerseys, feeding hay and dry food, not having a silo.

Mr. Wilcox manufactured over three tons of butter last year, which was nearly all disposed of at prices above mentioned.

HERD OF J. W. YALE.

The following is a description of the Devon herd, owned by Mr. J. W. Yale, of Meriden, Conn. Mr. Yale formerly kept grade cattle of the Durham, Devon, Ayrshire and Jersey breeds, but preferring the Devons, he commenced about twenty-five years ago with two cows and a bull, that was purchased from the editor of the "Herd Book."

He now has about thirty head, and considers them the best breed for New England that can be had. Mr. Yale has sold his milk for the last twenty-five years, giving satisfaction to his customers.

Dr. Jenkins, of the Experiment Station, tested the milk, and said it was No. 1 milk every way, and that there was not better to be had in the New Haven market. Mr. Yale had never weighed one cow's milk, but should judge with fair treatment, they would give from twelve to sixteen quarts at a time, and often are milked right through the year.

Devon cream has always held a high rank in the English market, and the butter is found firm, well flavored, and of fine color, the milk is also excellent for invalids and children.

The Devon breed is not hard to produce, as they are hardy and easy to keep, having a good disposition, the bulls seldom being cross. They have a fine form, with a warm sleek coat of the best color for our long winter stabling. While often called the "Little Reds," Mr. Yale has bred two bulls which, at four and five years, weighed 1,900 and 1,800 pounds. The Devons are a long-lived bred, Mr. Yale selling one that was seventeen years old, and was milked two years after, then selling for beef. Their meat is of the best, either as veal or beef.

HERD OF WM. D. HOLMAN.

The Riverside Stock Farm, situated on the West bank of the Willimantic river at West Willington Depot, is owned and carried on by Wm. D. Holman, who was born and has always lived in the place.

The herd is comprised of about thirty head of mostly thoroughbred Devons, an average of twelve cows kept in milk, the

cream of which is sent to the Mansfield Creamery. The skimmed milk is largely used in raising calves. The young cows and heifers of this herd find a ready market, several having been sent recently to York State and Vermont. The herd was started in 1878 from the well-known milking strain of Devons owned by the late Ex-Lieut. Gov. Hyde, and has been kept well bred up to the standard.

DAIRY FARM OF E. MANCHESTER & SONS, WINSTED, CONN.

The Prospect Hill Farm, established in 1859, by Edward Manchester, and conducted to-day by E. Manchester & Sons, (Edward, George and Harry) consists of 650 acres of land, located in the town of Winchester, borough of Winsted. It has been a dairy farm from the first.

The present herd consists of sixty Grade Jerseys, a large proportion of which were raised on the farm, with a registered

sire of good strain at the head of the above herd. It is the practice on this farm to raise all the well marked heifer calves.

The milk from the dairy is taken to the private creamery located on the farm. Through the cold weather butter is made for the Winsted market, the churn running every day, Sundays excepted.

During the warm months, (April 15th to Oct. 1st) four power freezers convert the cream of this and an adjoining herd into ice cream. This cream has gained a reputation, which in addition to monopolizing the retail trade of Winsted, has found for itself a large wholesale trade in three adjoining towns, Norfolk, Torrington, and New Hartford, also the entire sale to the Highland Lake Electric Pavilion.

Skimmed milk from the Prospect Hill Farm is retailed as skimmed milk in the Winsted market at half the price of whole milk.

A part of the skimmed milk is made into dutch cheese, put up in six ounce packages, and sold for five cents per package at the retail ice cream rooms.

The two leading crops of the farm are corn and potatoes, fifteen acres of corn, for the silos at either end of the long cow barn were raised this year.

The potato crop covers ten acres, and under strong fertilization, is very satisfactory. A part of the potato crop is for the seed potato trade, which has become extensive.

The Manchester formula for fertilizing is well known in this section.

The country is hilly, naturally rough, but of strong land, delightfully productive when freed from stone.

We have no fault to find along dairy and less important lines in Connecticut. G. E. MANCHESTER.

CLOVER DAIRY FARM.

The Clover Dairy Farm, owned by D. W. Patten, and situate in the town of North Haven, is partly represented in the accompanying cut.

This farm contains 225 acres and has been in possession of the Patten family nearly forty years, the original "Pierrepont Farm," where the late Hon. Edwards Pierrepont, ex-minister to England was born.

CLOVER DAIRY FARM OWNED BY D. W. PATTEN.

As a dairy farm it is second to none in the county, having furnished milk for the New Haven market for more than thirty years.

A herd of fifty choice grade cows are kept, and the daily average supply of milk is more than 400 quarts. The hay crop is estimated at 100 tons. A silo having a capacity of 10,000 bushels is used through the winter to furnish one feed daily.

Mr. Patten, a graduate of Yale, Class '87 S, is a member of the State Pomological Society and has a peach orchard of 1,500 trees. He is also a charter member of the North Haven Grange, a member of the State Dairymen's Association, and present member of the Legislature.

CHEESE.

The following is a sketch of the work done this last year at the Cheese factory of Mr. Edward Norton, Goshen, Conn.

The season for making Pineapple cheese commences April 1st, and continues to Dec. 1st. This last year Mr. Norton made more than the season before, but that is not as much as in some of the past years.

The purchase of milk will not be over two-thirds of a million pounds. The fancy trade demand some of the Gen'l P. Archer cheese, which weigh one pound, but most of the cheeses are made of the Picnic size.

The intense heat of the summer has caused some trouble and loss, as Picnic cheese cannot be covered over the entire surface, as Hoop cheese by bandage and caps. The months of September and October are the best months for making perfect cheese.

The above is an account of the only Cheese factory in the State, and the amount made upon our farms is very small. We have no accurate data as to the exact amount. In my report for 1897 an account was given of the cheese manufactured in most of the States and in Canada. Statistics show that there has been no marked change in the amount manufactured during the past year.

MOLASSES.

The enforcement of the law relating to the sale of adulterated molasses is one of the important divisions over which this department has charge. This law was enacted in 1887 and was materially strengthened in 1889 by an amendment, relating to the soliciting and receiving any orders for the sale or delivering into the State of any adulterated molasses.

There is quite a large quantity of molasses consumed in the State, and people are desirous of procuring it in its pure state, but with this as with many other articles of food which are put upon the market, serious adulterations are made. Glucose, a cheap product from cornstarch entered the market several years ago, but did not obtain much prominence until the last few years. It is now manufactured in large quantities, and sold at wholesale at a very low price. This is largely used as an adulterant for syrups, molasses, honey, etc. There are other preparations from starch together with dextrose, salts of tin, and terra alba used as adulterants. A very large proportion of the adulteration of molasses is done in New York, but with the "New Orleans" especially, a considerable quantity is mixed before it is shipped.

Very careful work has been carried on under this law during the past year. We have visited all parts of the State, and examined the goods in a large number of stores in every city and nearly every large town in the State. Several hundred samples have been taken and submitted to analysis. The results of the analysis are shown in the table given below. We are very glad to report that the percentage of adulterated samples is very much smaller than it was one year ago.

We have many wholesale dealers in the State, and these are all endeavoring to carry only strictly pure first-class goods, many of them having it analyzed before putting it in market. And we are glad to note that there is very much more care taken by the retail dealers. Consumers are desiring of purchasing the pure article, and dealers are looking more carefully into the purity of the goods which they purchase and offer for sale. This law is giving good satisfaction throughout the State, and with its thorough enforcement the dealers are helped to obtain a pure

article, and consumers can get a good molasses instead of one which has been mixed with glucose, costing perhaps two cents a pound at wholesale, or some other inferior substance.

The following is the amended law as it now stands relating to the sale of adulterated molasses.

LAW IN RELATION TO THE SALE OF MOLASSES.

SECTION 2620. It shall be the duty of the Dairy Commissioner to attend to the enforcement of the law against the adulteration of molasses and the sale of adulterated molasses, and, for the purposes of examining into suspected violations of such law, he shall, at all reasonable hours have free access to all places and premises where he suspects that molasses is adulterated or adulterated molasses is sold, and, on tender of the market price of good molasses for the same, he may take from any person, firm, or corporation samples of molasses which he suspects is adulterated, and he may have samples of molasses suspected to be adulterated analyzed by any State chemist, or by the Experiment Station, and a sworn or affirmed certificate of such analyst shall be *prima facie* evidence of the ingredients and constituents of the samples analyzed; and if such analysis shall show that the molasses is adulterated, he shall make complaint to the proper prosecuting officer, that the person or persons who adulterated said molasses, or sold or exposed for sale such adulterated molasses, may be prosecuted.

SEC. 2621. Any person refusing the Dairy Commissioner or his deputy access, in a reasonable manner, and at a reasonable time for said purpose of examination, or refusing to sell samples, as hereinbefore provided, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

SEC. 2622. Any person who shall adulterate any molasses, or who shall sell or offer or expose for sale, or who shall solicit or receive any order for the sale or delivery within this State, or for delivery without this State for shipment into this State, or of any molasses adulterated with salts of tin, terra alba, glucose, dextrose, starch sugar, corn syrup, or other preparation of, or from starch, shall be fined not more than five hundred dollars or imprisoned not more than one year, or both. The delivery of any of the above-mentioned preparations, upon any order solicited or received within this State, shall be conclusive evidence that the order, upon which such delivery was made, was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above described.

Approved, June 21, 1889.

The following is the analysis of a portion of the samples of molasses taken in different parts of the State.

* Signifies adulterated.

No.	Direct Polarization Sugar Degrees.	POLARIZATION AFTER INVERSION. Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of.	Retail or Wholesale.	County.
45	60.6	—21.8	22	0.0	Syrup,	Retail,	Hartford.
46	55.8	—21.2	22.2	0.0	Syrup,	Retail,	"
48					Porto Rico,	Retail,	"
56	46.5	—19.5	24	0.7	New Orleans,	Retail,	"
57	42.7	—14.9	24	0.0	New Orleans,	Retail,	"
58	47.9	—13.3	24	0.0	Porto Rico,	Retail,	"
*59	64.1	10.7	23	24.1	New Orleans,	Retail,	"
*60	81.1	32.7	23	43.3	Porto Rico,	Retail,	"
61	38.5	—18.7	24	0.0	New Orleans,	Retail,	"
62	47.3	—14.5	22	0.0	Porto Rico.	Retail,	"
*63	81.9	64.0	22	..	New Orleans,	Retail,	"
64	38.7	—18.3	22	0.0	New Orleans,	Retail,	"
65	50.3	—13.3	24	5.1	Porto Rico,	Retail,	"
66	40.5	—18.3	23	..	New Orleans,	Retail,	"
67	47.9	—18.3	22	1.7	New Orleans,	Retail,	"
68	50.3	— 7.3	21	7.7	Porto Rico,	Retail,	"
69	59.7	— 2.3	20	14.7	New Orleans,	Retail,	"
70	40.7	—20.3	24	0.0	New Orleans,	Retail,	"
71	36.2	— 5.3	21	..	Porto Rico,	Retail,	"
72	50.2	—16.6	19	1.2	New Orleans,	Retail,	"
73	50.2	— 9.6	19	8.4	Porto Rico,	Retail,	"
74	58.6	— 0.8	20	15.6	New Orleans,	Retail,	"
75	48.0	—16.6	21	3.6	Porto Rico,	Retail.	"
*76	79.0	43.6	20	51.6	New Orleans,	Retail,	"
77	45.0	—11.4	17	..	Porto Rico,	Retail,	"
78	42.4	—21.6	18	0 0	New Orleans,	Retail,	"
*79	113.0	98.6	22	96.6	New Orleans,	Retail,	"
80	43.8	— 8.4	26	..	Porto Rico,	Retail,	"
81	42.0	—17.6	25	..	Porto Rico,	Retail,	Fairfield.
*82	49.8	—15.0	24	..	New Orleans,	Retail,	"
83	48.0	—13.2	24	..	New Orleans,	Retail.	"
84	42.6	—17.6	24	..	Porto Rico,	Retail,	"
85	40.0	—17.8	24	..	New Orleans,	Retail,	"
86	51.8	—14.7	24	..	Porto Rico,	Wholesale,	"
87	41.8	—19 1	24	..	New Orleans,	Retail,	"
88	47.2	—11.7	24	..	Porto Rico,	Retail,	"
89	41.0	—18.7	24	..	New Orleans,	Retail,	"
90	51.0	—14 3	24	..	Porto Rico,	Retail,	"
91	44.0	—18.0	25	..	New Orleans,	Retail,	"
92	44.0	—15.4	25	..	Porto Rico,	Retail,	"

No.	Direct Polarization Sugar Degrees.	POLARIZATION AFTER INVERSION. Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of.	Retail or Wholesale.	County.
93	34.0	— 7.9	24	..	New Orleans,	Retail,	Hartford.
94	50.0	— 1.3	24	..	New Orleans,	Retail,	"
95	39.6	—15.4	24	..	Porto Rico,	Retail,	"
96	33.6	—11.0	27	..	Porto Rico,	Retail,	"
97	44.4	—13.2	23	..	New Orleans,	Retail,	"
98	51.2	—13.2	22	..	Porto Rico,	Retail,	"
99	49.2	—18.5	23	..	New Orleans,	Retail,	"
100	52.0	—14.1	23	..	Porto Rico,	Retail,	"
*101	86.4	60.7	23	..	Porto Rico,	Retail,	"
102	47.6	—20.5	23	..	New Orleans,	Retail,	"
*103	74.6	15.6	23	..	New Orleans,	Retail,	New Haven.
104	47.4	—16.5	23	..	Porto Rico,	Retail,	"
105	47.2	—14.3	23	..	New Orleans,	Retail,	"
106	41.2	—19.8	24	..	Porto Rico,	Retail,	"
107	54.0	5.9	24	..	New Orleans,	Retail,	"
108	32.4	—14.3	24	..	Ponce,	Retail,	"
109	40.0	—15.4	24	..	New Orleans,	Retail,	"
110	48.0	— 6.6	24	..	Porto Rico,	Retail,	"
111	48.6	—10.6	25	..	New Orleans,	Retail,	"
112	50.0	—11.9	25	..	Porto Rico,	Retail,	"
113	41.0	— 1.3	23	..	New Orleans,	Retail,	"
114	37.2	—11.4	26	..	Ponce,	Retail,	"
115	41.4	—18.0	27	..	New Orleans,	Retail,	Windham.
116	48.0	—10.3	27	..	Porto Rico,	Retail,	"
117	47.0	—17.6	27	..	New Orleans,	Retail,	"
118	45.6	—13.2	27	..	Porto Rico,	Retail,	"
119	57.4	—17.6	28	..	New Orleans,	Retail,	"
120	47.4	—15.0	27	..	Porto Rico,	Retail,	"
121	35.4	—16.7	27	..	New Orleans,	Retail,	"
122	47.4	—12.1	27	..	Porto Rico,	Retail,	"
123	56.8	— 2.2	27	..	New Orleans,	Retail,	"
124	48.4	—11.4	25	..	Porto Rico,	Retail,	"
125	41.6	—16.5	27	..	New Orleans,	Retail,	"
*126	45.6	— 9.9	27	..	Porto Rico,	Retail,	"
127	47.4	—18.0	27	..	New Orleans,	Retail,	"
*128	91.6	55 0	26	..	Porto Rico,	Retail,	"
129	48.8	— 8.4	23	..	New Orleans,	Retail,	"
130	49.4	—12.8	23	..	Porto Rico,	Retail,	"
131	47.2	—17.2	25	..	New Orleans,	Retail,	"
132	48.0	—13.9	26	..	Porto Rico,	Retail,	"
133	44.0	—18.7	27	..	New Orleans,	Retail,	"
134	44.0	— 9.9	25	..	Porto Rico,	Retail,	"
135	40.0	—17.8	27	..	New Orleans,	Retail,	"
136	49.0	—17.2	25	..	Porto Rico,	Retail,	"

.	Direct Polarization Sugar Degrees.	POLARIZATION AFTER INVERSION. Sugar Degrees.	At Tem. of.	Sugar Degrees at 80° C.	Kind of.	Retail or Wholesale.	County.
137	43.0	—15.8	24	..	New Orleans,	Retail,	Windham.
138	48.6	—12.5	23	..	Porto Rico,	Retail,	"
139	54.0	—16.1	23	..	New Orleans,	Retail,	"
140	51.6	—12.1	28	..	Porto Rico,	Retail,	"
141	47.0	—11.0	28	..	New Orleans,	Retail,	"
142	47.0	—15.0	28	..	Porto Rico,	Retail,	"
143	42.8	—17.6	27	..	New Orleans,	Retail,	"
144	46.4	—13.2	23	..	Porto Rico,	Retail,	"
*145	79.6	37.0	28	..	Ponce,	Retail,	"
146	35 0	—12.8	27	..	New Orleans,	Retail,	"
147	39.0	—18.3	24	..	New Orleans,	Retail,	"
148	46.0	—15.4	24	..	Porto Rico,	Retail,	"
149	49.8	—19.8	24	..	New Orleans,	Retail,	"
150	43.6	—10.3	25	..	Porto Rico,	Retail,	"
151	56.6	—20.5	24	..	New Orleans,	Retail,	"
152	40.4	—17.2	26	..	New Orlerns,	Retail,	"
153	48.6	.....	..	..	New Orleans,	Retail,	"
154	49.4	.....	..	..	Porto Rico,	Retail,	"
155	48.4	.....	..	..	New Orleans,	Retail,	"
156	34.0	.....	..	..	Porto Rico,	Retail,	"
*157	60.8	—30.8	24	..	New Orleans,	Retail,	"
158	51.4	.....	..	..	New Orleans,	Retail,	"
159	36.0	.....	..	..	New Orleans,	Retail,	New London.
160	48.2	.....	..	..	Porto Rico,	Retail,	"
161	50.0	.....	..	..	New Orleans,	Retail,	"
162	44.4	.....	..	..	New Orleans,	Retail,	"
163	42.0	.....	..	..	Porto Rico,	Retail,	"
164	40.8	.....	..	..	New Orleans,	Retail,	"
165	41.0	.....	..	..	New Orleans,	Retail,	"
166	39.4	.....	..	..	Porto Rico,	Retail,	"
167	43.4	.....	..	..	New Orleans,	Retail,	"
168	41.8	.....	..	..	New Orleans,	Retail,	"
*169	65 0	12.1	25	..	New Orleans,	Retail,	"
*170	65.0	11.7	24	..	New Orleans,	Retail,	"
171	60.0	— 2.2	24	..	New Orleans,	Retail,	"
172	50.8	—18.7	24	..	New Orleans,	Retail,	"
173	62.0	2.2	26	..	New Orleans,	Retail,	"
174	44.0	.....	..	..	New Orleans,	Retail,	"
175	41.8	.....	..	..	New Orleans,	Retail,	"
176	46.6	.....	..	..	New Orleans,	Retail,	"
*177	103.6	71.0	24	73.0	New Orleans,	Retail,	"
178	20.0	.....	..	..	New Orleans,	Retail.	"
179	46.0	.....	..	..	New Orleans,	Wholesale,	"
180	54.6	—16.7	24	..	New Orleans,	Retail,	"

No.	Direct Polarization Sugar Degrees.	POLARIZATION AFTER INVERSION. Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of.	Retail or Wholesale.	County.
*181	61.6	15.0	25	..	New Orleans,	Wholesale,	New London.
182	46.2	.....	..	..	New Orleans,	Wholesale,	Hartford.
183	45.6	.....	..	..	Porto Rico,	Retail,	"
184	52.8	.....	..	..	Porto Rico,	Retail,	Litchfield.
185	49.2	.....	..	..	New Orleans,	Retail,	"
186	45.0	.....	..	..	Ponce,	Retail,	"
187	36.6	.....	..	..	New Orleans,	Retail,	"
188	49.0	.....	..	..	Porto Rico,	Retail,	"
189	44.9	.....	..	..	New Orleans,	Retail,	"
190	46.0	.....	..	..	Porto Rico,	Retail,	"
191	49.0	.....	..	..	New Orleans,	Wholesale,	Hartford.
192	48.6	.....	..	..	New Orleans,	Wholesale,	"
216	46.3	—10.8	24	..	New Orleans,	Retail,	Litchfield.
217	51.1	— 2.9	23	8.0	Porto Rico,	Retail,	"
218	43.3	—18.3	23	1.7	New Orleans,	Retail,	New Haven.
219	46.7	—14.1	21	2.3	Porto Rico,	Retail,	"
*221	104.6	86.9	22	86.3	Syrup,	Retail,	"
222	47.5	—14.3	21	..	New Orleans,	Retail,	"
*223	70.3	29.7	22	40.0	Fancy Ponce,	Retail,	Fairfield.
*224	122.6	103.7	23	101.7	Vanilla Drips,	Retail,	"
225	49.7	—12.9	24	4.7	Porto Rico,	Retail,	"
226	42.1	—18.3	22	..	New Orleans,	Retail,	"
228	39.1	—13.3	24	0.0	Syrup,	Retail,	New Haven.
229	41.1	—18.7	26	0.0	New Orleans,	Retail,	"
230	37.1	—13.3	25	7.7	New Orleans,	Retail,	"
231	47.3	—11.7	23	0.0	Porto Rico,	Retail,	"
232	51.3	.....	..	..	Porto Rico,	Retail,	"
*236	106.9	83.1	24	81.7	New Orleans,	Retail,	"
238	24.1	.....	..	..	Porto Rico,	Wholesale,	"
239	23.2	.....	..	..	New Orleans,	Retail,	"
240	43.9	—13.4	25	..	Porto Rico,	Retail,	"
241	45.1	—18.3	24	0.0	New Orleans,	Retail,	"
*242	135.4	117.3	24	109.7	Syrup,	Retail,	"
243	51.7	0.2	28	..	Ponce,	Retail,	"
244	38.4	—16.0	28	..	New Orleans,	Retail,	"
245	47.0	—10.8	28	..	Ponce,	Retail,	"
246	104.6	79.0	28	..	Syrup,	Retail,	"
247	40.0	—14.4	27	...	New Orleans,	Retail,	"
248	43.4	—16.0	26	..	New Orleans,	Retail,	"
300	44.6	—20.2	24	..	New Orleans,	Retail,	Hartford.
301	49.0	—19.4	24	..	New Orleans,	Retail,	"
302	54.0	—11.0	24	..	New Orleans,	Retail,	"
*303	113.2	96.4	23	..	New Orleans,	Retail,	"
304	45.4	—13.9	26	..	New Orleans,	Retail,	"

No.	Direct Polarization Sugar Degrees.	POLARIZATION AFTER INVERSION. Sugar Degrees.	At Tem. of.	Sugar Degrees at 86° C.	Kind of.	Retail or Wholesale.	County.
305	39.2	—18.0	26	..	Porto Rico,	Retail,	Hartford.
*306	96.8	57.9	24	..	New Orleans,	Retail,	"
307	38.6	—17.6	25	..	Porto Rico,	Retail,	"
308	53.0	— 2.0	25	..	Porto Rico,	Retail,	"
309	48.0	—18.5	25	..	New Orleans,	Retail,	"
310	42.2	—17.6	25	..	New Orleans,	Retail,	"
311	31.4	.....	..	..	New Orleans,	Retail,	"
312	46.	.....	..	..	Porto Rico,	Retail,	"
313	52.8	.....	..	..	New Orleans,	Retail,	"
314	52.2	.....	..	..	New Orleans,	Retail,	New Haven.
315	42.0	.....	..	..	New Orleans,	Retail,	"
316	47.3	.....	..	..	Porto Rico,	Retail,	"
317	49.8	.....	..	..	New Orleans,	Retail,	"
318	40.0	.....	..	..	New Orleans,	Retail,	"
319	49.0	.....	..	..	New Orleans,	Retail,	Windham.
320	46.4	.....	..	..	New Orleans,	Retail,	"
321	47.0	.....	..	..	Porto Rico,	Retail,	New London.
322	47.4	.....	..	..	New Orleans,	Retail,	"
323	46.0	.....	..	..	Porto Rico,	Retail,	"
324	48.8	.....	..	..	New Orleans,	Retail,	"
325	50.6	.....	..	..	Porto Rico,	Retail,	"
326	48.8	.....	..	..	New Orleans,	Retail,	"
327	43.2	.....	..	..	Porto Rico,	Retail,	"
328	49.2	.....	..	..	New Orleans,	Retail,	"
329	25.0	.....	..	..	Porto Rico,	Retail,	"

The above table show that two hundred and eleven samples of molasses and syrups have been examined at the Experiment Station.

The Result of the analysis may be sumarized as follows :

	NUMBER OF SAMPLES. Not Found Adulterated.	Suspected of Adulteration.	Containing Glucose.	Total.
Molasses, New Orleans,	95	4	15	114
" Porto Rico,	64	5	7	76
" Source Unknown,	13	..	..	13
Sprups,	..	..	3	3
" "Vanilla Drips,"	..	..	2	2
Sugar House Syrup,	1	..	..	1
Maple Syrup,	2	..	..	2
Total,	175	9	27	211

Of the 211 samples examined, 175 or 82.9% were not found adulterated with glucose. An examination of the analysis given on pages 68–72 of the Dairy Commissioners' Report for the year ending Sept. 30, 1897, shows that last year only 66.8% of the samples were free from glucose.

The numerous prosecutions which have been brought have had their effect in driving adulterated molasses out of the State.

VINEGAR.

LAW IN RELATION TO THE MANUFACTURE AND SALE OF VINEGAR.

SECTION 1. No person shall make and sell, or make for sale, as cider vinegar, and vinegar not produced wholly from the juice of apples. No person shall add to any vinegar, or to any article sold or to be sold as vinegar, any drug, any hurtful or foreign substance, any coloring matter, or any acid. Any person violating this section of this act shall be fined fifty dollars for a first offense, and for a second or later offense he shall be fined one hundred dollars and imprisoned thirty days.

SEC. 2. No person shall make and sell, or make for sale, any vinegar not having an ascetic acidity equivalent to the presence therein and not less than four per centum by weight, of absolute ascetic acid, and in case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water. No maker of vinegar shall sell the same without conspicuously branding, stenciling, or painting upon the head of the barrel, cask, keg, or package containing the same, the name of the maker, his residence or place of manufacture, and the true name of the kind of vinegar contained therein as "cider vinegar," "wine vinegar," "malt vinegar," or "wood acid vinegar;" provided, that this clause concerning marking shall not apply to retail sales, at the place of manufacture, in quantities of less than five gallons, and in open packages, Any person violating this section of this act shall be fined ten dollars for a first offense, and for a second or later offense fifty dollars.

SEC. 3. No person shall sell, or offer, or expose for sale or exchange, or solicit, or receive any order for the sale or delivery within this State, or for delivery without this State for shipment into this State: first, any vinegar, as cider vinegar, not wholly produced from the juice of apples; or second, any vinegar, or article sold, or to be sold as vinegar, in which has been added any drug, or any hurtful or foreign substance, or any coloring matter. or any acid; or third, and vinegar not having an acetic acidity equivalent to the presence therein of not less than four per centum by weight of absolute acetic

acid, and in case of cider vinegar, not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water; or fourth, any vinegar in a barrel, cask, keg, or other package not branded, stenciled, or painted as required by a previous section of this act. Any person violating this section of this act shall be fined ten dollars for a first offense, and for a second, or later offense fifty dollars. The delivery of any of the above-mentioned articles upon any order solicited or received within this State shall be conclusive evidence that the order upon which such delivery was made was for such articles, and shall render the person soliciting or receiving such order liable to the penalty above prescribed.

SEC. 4. It shall be the duty of the Dairy Commissioner to attend to the enforcement of this act: and for the purpose of examining into suspected violations thereof, he shall at all reasonable hours have free access to all places and premises where he suspects that any provision of this act is violated, and on tender of the market price of good vinegar therefor, he may take from any person, firm, or corporation, samples of vinegar which he suspects of being made or sold in violation of this act; and he may himself analyze such samples, or have such samples analyzed by any State chemist, or by the Experiment Station; and a sworn or affirmed certificate by such analyst shall be *prima facie* evidence of the ingredients and constituents of the sample analyzed; and if such analysis shall show that such sample does not conform to any requirement of this act, and shall give the Dairy Commissioner reasonable ground for the belief that any provision of this act has been violated, he shall make complaint to the proper prosecuting officer, to the end that the violator may be prosecuted.

SEC. 5. Any person refusing the Dairy Commissioner, or his deputy, access, in a reasonable manner and at a reasonable time, for said purpose of examination, or refusing to sell samples, as hereinbefore provided, shall be fined not more than seven dollars or imprisoned not more than thirty days, or both. Evidence of any violation of this act shall be *prima facie* evidence of willful violation with knowledge.

Approved, March 29—June 21, 1889.

By frequent examinations made of the Vinegar Manufactories, and tests made at the Connecticut Experiment Station, also at the Dairy Commissioner's office, from the samples collected in every section of the State on sale from the stock of the wholesale and retail grocers, have found during the past year that the vinegar is more nearly up to the standard of quality and purity than formerly, and that there is a more general desire of acquiesence upon the part of the dealers in vinegar to obey and comply with the law. The dealer and consumer alike acknowledge the justice

and propriety of such a "Vinegar Law," and they further fully insist upon a practical and thorough enforcement of the same, relying upon the belief that its enforcement will have the tendency to establish a uniform price, a guarantee of quality which will materially increase and stimulate the trade by the ability to supply the market with an honest and pure "Cider Vinegar" that will be a wholesome product for general use.

In regard to the "Branding" many are still ignorant of the law covering that point and we find principally among the small dealers that the casks or barrels are not branded as they should be, hence we again call attention to that point and must insist upon a thorough branding of every cask or barrel where vinegar is placed to be sold upon the market, in whatever quantity.

Aside from the above facts we find the "Vinegar Law" a complete success, and the aim of this department is to keep it up to this point.

Following is a list of a portion of the samples taken in the year, and the results of the analysis:

No.	Kind.	Solids, Per Cent.	Acidity, Per Cent.
1	Cider Vinegar,	2.10	2.80
2	Cider Vinegar,	1.80	4.87
3	Cider Vinegar,	3.18	5.16
4	Cider Vinegar,	2.00	3.03
5	Cider Vinegar,	2.05	6.41
6	Cider Vinegar,	1.67	4.33
26	Cider Vinegar,	2.22	4.02
27	Red Cross Vinegar,	.14	3.89
28	Cider Vinegar,	2.50	5.67
30	Cider Vinegar,	2.95	5.06
31	Cider Vinegar,	1.96	5.63
32	Cider Vinegar,	2.03	4.90
33	Cider Vinegar,	2.09	5.09
42	Cider Vinegar,	2.34	4.74
34	Cider Vinegar,	1.74	4.84
55	Cider Vinegar,	3.57	6.33
193	Cider Vinegar,	1.29	5.21
194	Cider Vinegar,	1.03	5.13
195	Cider Vinegar,	1.99	3.57
196	Cider Vinegar,	1.41	3.81
197	Cider Vinegar,	1.84	5.58
199	Cider Vinegar,	1.60	5.63
200	Cider Vinegar,	1.87	5.59
205	Cider Vinegar,	1.46	7.63
206	Cider Vinegar,	2.47	4.92

No.	Kind.	Solids, Per Cent.	Acidity, Per Cent.
207	Cider Vinegar,	2.05	5.04
208	Cider Vinegar,	1.98	4.75
209	Cider Vinegar,	1.90	3.82
210	Cider Vinegar,	2.16	4.79
211	Cider Vinegar,	2.03	3.24
212	Cider Vinegar,	1.96	4.21
213	Cider Vinegar,	.43	4.77
214	Cider Vinegar,	2.91	4.41
215	Cider Vinegar,	2.50	4.65
216	Cider Vinegar,	1.51	4 33
217	Cider Vinegar,	2.14	4.87
218	Cider Vinegar,	2.01	5.40
219	Cider Vinegar,	2.09	4.16
220	Cider Vinegar,	2.17	3.30
221	Cider Vinegar,	2.41	4.04
222	Cider Vinegar,	2.04	4.19
223	Cider Vinegar,	1.50	5.53
224	Cider Vinegar,	1.58	3.58
225	Cider Vinegar,	1.93	5.18
228	Cider Vinegar,	1.58	5.06
229	Cider Vinegar,	2.18	4.14
230	Cider Vinegar,	2.60	4.16
231	Cider Vinegar,	2.09	4.84
232	Cider Vinegar,	2.10	4.62
233	Cider Vinegar,	2.61	4.19
234	Cider Vinegar,	2.03	4.75
235	Cider Vinegar,	3.34	4.50
237	Cider Vinegar,	1.98	4.41
238	Cider Vinegar,	2.01	3.82
239	Cider Vinegar,	2.00	4.53
206 b	Cider Vinegar,	2.95	4.31
207 b	Cider Vinegar,	2.83	3.94
208 b	Cider Vinegar,	2.14	3.97
209 b	Cider Vinegar,	2.30	4.33
210 b	Cider Vinegar,	1.50	4.16
211 b	Cider Vinegar,	2.01	3.94
212 b	Cider Vinegar,	1.74	2.94
233 b	White Wine Vinegar,	.22	4.60
234 b	White Wine Vinegar,	.15	4.60
226 b	White Wine Vinegar,	.25	4.53
213 b	Cider Vinegar,	4.13	4.89
214 b	Cider Vinegar,	2.19	4.35
215 b	Cider Vinegar,	1.59	3.84
235 b	Acid Vinegar, Cider,	.25	4.43
237 b	Acid Vinegar, Cider,	.17	4.48
249	Acid Vinegar, Cider,	.16	5.65
250	Cider Vinegar,	2.44	4.99

No.	Kind.	Solids, Per Cent.	Acidity, Per Cent.
252	Cider Vinegar,	2.38	4.28
253	Cider Vinegar,	1.30	2.73
254	Cider Vinegar,	1.92	4.53
255	Cider Vinegar,	2.22	5.65
256	Cider Vinegar,	1.20	4.60
257	Cider Vinegar,	1.75	5.14
258	Cider Vinegar,	3.61	5.74
259	Cider Vinegar,	1.68	4 84

We have had one quite important suit under the law, that was brought over from last year of which mention was made in my last report.

Three samples of vinegar were taken at different times from casks branded "Cider Vinegar" that was manufactured and sold by a party in New Haven. The above samples were submitted for analysis, and the returns from the chemist gave in one case, .60 per cent. solids and .63 and .94 per cent. in the other two. Suit was brought against the party on September 28, 1897, in the City Court, New Haven, the case was put over until November 1st.

The defence made, was that the law was unconstitutional, as it was impossible to make pure cider vinegar with two per cent. solids.

You will note that the above samples were not only below the standard required by law—2 per cent.—but were below 1 per cent.

Witnesses who are large manufacturers of pure cider vinegar testified in favor of the law, and many samples taken in different parts of the State and submitted for analysis showed that pure cider vinegar will usually contain two or more per cent. solids.

The party was convicted and fined, an appeal was then taken.

The case was tried at the May term of the Court of Common Pleas, before a jury, with Judge Studley upon the bench. Hon. Geo. M. Gunn, prosecuted for State, Attorney Jacob P. Goodhart for the defence.

The points brought out were the same as in the lower Courts.

The case lasted several days, and during the trial the facts were well sustained that the law was a correct one, and that the legal standard could be easily reached. The jury brought in a verdict of guilty, and a fine of $10 and $291.29 costs was imposed, thus sustaining the Connecticut law, which is similar to that in many other States.

The following gives the legal standard in several States:

Cider Vinegar	Solids. Per cent.	Acidity. Per cent.
Connecticut,	2	4
Ohio,	2	4
Minnesota,	2	4½
Michigan,	1¾	4
Pennsylvania,	1½	4
New York,	2	4½
New Jersey,	2	4½

The charge of Judge Studley to the jury in the vinegar case cited above, is here given:

COURT OF COMMON PLEAS.

CRIMINAL SIDE.

STATE
vs.
ZASTROW.

CHARGE OF THE COURT.

Gentlemen of the Jury:

This prosecution is based upon Section 2, Chapter 67 of the Public Acts of 1897, which, so far as it relates to this prosecution, is in the following words: "No person shall make or sell or make for sale any vinegar not having an acetic acidity equivalent to the presence therein of not less than four per centum by weight of absolute acetic acid, and in the case of cider vinegar not less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water."

The defendent is charged with a violation of that part of the provision relating to cider vinegar. There is no claim made but that the acetic acid was correct.

The State claims to have proved that the defendant, at the time and place alleged in the complaint, made for sale certain cider vinegar having less than two per centum by weight of cider vinegar solids upon full evaporation over boiling water. In a criminal case the defendant is presumed to be innocent until proven guilty; the burden of the proof is upon the State, and in order to secure a conviction it must prove every material fact in the case beyond a reasonable doubt. If the State has failed to do this, the defendant is entitled to an acquittal.

The term "reasonable doubt" is not easily defined; but, in the opinion of the court, if, after weighing carefully all the testimony in the case, both that offered on behalf of the State, and that on behalf of the defendant, you believe the defendant guilty as charged, then you do not entertain a reasonable doubt.

It is conceded in the case that the defendant's cider vinegar is not up to the standard required by the Statute; but the defendant

claims that the Statute fixes an impossible standard as to cider-vinegar solids in cider vinegar,and is void. In the opinion of the court, if the requirements of the Statute as to such solids in cider vinegar are as claimed by the defendant. then the Statute, so far as it relates to such solids, is void, and the defendant entitled to an acquittal.

This Statute, passed in 1897, is an amendment of Chapter 60 of the Public Acts of 1889, which is an act entitled "An Act to prevent fraud in the sale and manufacture of vinegar." The requirements of the Act of 1897, so far as they relate to cider vinegar solids in cider vinegar, are identical with the requirements of Section 2, Chapter 60, of the Acts of 1889.

The State claims that the standard required by the Statute is not only possible but that it is entirely practicable.

You have heard the testimony offered on behalf of the defendant and on behalf of the State. The defendant introduced the results of analysis, made by Professor Smith, of the vinegar made by him from apple juice procured of Mr. Isbell on September 30, 1897; also vinegar made by him from apple juice procured of Mrs Scripture October 1, 1897; and also of vinegar made from apple juice by him procured of Mr. Bigelow, October 1st, 1897. He also introduced analyses of cider vinegar procured from Mr Russell, from Mr. Gordon, from Mr. Field, from Mr. Fredericks which had been procured from Russell; also analyses of two samples of the defendant's cider vinegar, one labeled '95 and one '95 mixed with '96. He also introduced Prof. Smith, and by his and other testimony claims to have proved that the said standard for cider vinegar solids is impossible.

The State introduced the results of analysis made by Dr Jenkins of cider vinegar procured of Mr. Fenner, Mr. Thompson, and of Mr. Barber, two samples being taken of Mr. Thompson, and claims that the analysis in each case showed the solids to be in excess of the standard required by the Statute, the highest being claimed to be 2.95of solids, and the lowest 2.01 of solids, and that one of the defendant's samples analyzed by Prof. Smith showed 2.20 of solids, and claims to have proved that it is possible and practicable to make cider vinegar of the standard required by the Statute.

In the opinion of the court, it is not enough to show that it is difficult to make cider vinegar of the required standard. The Legislature has the power to fix a standard for solids which imposes hardships upon those engaged in the manufacture of cider vinegar for sale.

You will observe that the Statute does not prohibit any person from manufacturing cider vinegar for his own use which has a lower standard than two per centum of solids. The Statute only applies to those who make and sell or make for sale; but those who do not make and sell or make for sale are at liberty to make cider vinegar without any regard to the standard fixed by the Statute; but if a person desires to buy cider vinegar, the law steps in and undertakes to protect him in his purchase by fixing the standard for its solids, and the law requires a person who makes cider vinegar for sale to comply with

that standard. If the standard fixed by law is practically impossible of attainment, then, as the court has already instructed you, in its opinion the law is void. But, in determining this question, it is not enough that some people have failed to get their cider vinegar up to the standard; they may have bought cider of a poor quality, or may have used improper methods in manufacturing the vinegar, or may have failed for some other reason; and the Legislature may have had these matters in view when it passed the law.

The State claims to have proved that the samples of cider vinegar procured from Mr. Fenner showed 2.95 per centum of cider vinegar solids and that he was manufacturing from two hundred to four hundred barrels a year; that the samples procured from Mr. Thompson showed respectively 2.03 per centum and 2.09 per centum of such solids, and that he was manufacturing about one thousand barrels a year; and that the sample procured from Mr. Barber showed 2.01 per centum of such solids; and that one sample furnished by the defendant to Prof. Smith showed 2.20 per centum of such solids, and that these results were obtained in the manner required by the Statute. If you find these facts as claimed by the State, you will consider them along with the other facts in the case in determining whether the standard is an impossible one or not. Is it possible or impossible? It is for you to say.

The defendant claims that, in determining the question as to whether cider vinegar solids amount to any less than two per centum by weight upon full evaporation over boiling water, sugar should be excluded, for the words "cider vinegar, as used in the Statute, are intended to mean the product in its perfected form and free from any substance that is no part of the perfected product, and that the words are intended to mean the pure food product. Upon this topic, I charge, as the defendant requests, that, in the opinion of the court, if you find upon the evidence that sugar is no constituent part of cider vinegar solids that should be contained in the product known as cider vinegar, then, in determining the amount of solids to be found in cider vinegar, sugar should not be considered as one of the constituents thereof; and if you find that normal cider vinegar or pure cider vinegar cannot contain two per centum of solids upon evaporation as provided for by the Statute, then the Statute is void, and the accused is not guilty.

The Statute itself does not specify what constitutes cider vinegar solids, and it does not in terms exclude sugar. Both the defendant and the State have offered testimony upon that question.

The experts have given you the benefit of their knowledge as to what the solids are, so far as they are known. The defendant claims to have proved that, in the case of pure cider vinegar, the process being completed, the sugar ought to have turned into alcohol, and the alcohol into acetic acid, leaving no sugar, or practically none.

The State claims to have proved that sugar is always present in greater or less quantities, and that it is actually a solid. It also claims

that it is a solid within the contemplation of the words "cider vinegar solids" as used in the Statute, and that when cider vinegar has been subjected to full evaporation over boiling water, it is always found among the resulting solids in considerable quantities. The State claims to have proved that, in each completed analysis made on behalf of the State and on behalf the defendant, with one exception, sugar was present in considerable quantities. It is your province to decide what has been proved, and what the facts are.

In the opinion of the court, the Statute ought to be so interpreted as to preserve rather than to destroy it, if it can reasonably be done. There is a presumption that the Legislature intended that every word and phrase in the Statute should be of some effect: accordingly, if the language will reasonably permit, the Statute should be so construed that the same may stand and be of force. The rule of strict construction is not violated by giving the words of the Statute their full meaning, or the more extended of two meanings, as the wider and popular instead of the narrower, technical meaning. The words should be taken in such a sense, bent neither one way nor the other, as will best manifest the legislative intent. In the opinion of the court the purpose of the Statute was to fix a standard for cider vinegar solids for the purpose of preventing fraud in the manufacture and sale of cider vinegar, and the words should not be narrowed to the exclusion of what the Legislature intended. In the opinion of the court, the long continued practice of officers required to execute or take special cognizance of a Statute, is some, though not very weighty, evidence of the meaning of the Statute. The Statute in regard to cider vinegar solids was approved March 29, 1889. The Statute makes it the duty of the Dairy Commissioner to attend to its enforcement. It also provides that he may have samples analyzed by any State chemist or the Experiment Station. The State claims to have proved that the Commissioner and the person acting at the Experiment Station have, ever since this Statute became a law, regarded sugar as a cider vinegar solid, and they have not until the question was raised by the defendant in the present case, made a special test for sugar alone. If you find the fact to be as claimed by the State, you may properly consider it along with the other facts of the case.

You have heard the testimony offered on behalf of the State and on behalf of the defendant. It is your duty to weigh it all with care. You will take into consideration the opportunities which the witnesses had of knowing what they were testifying to. It is your duty to reconcile conflicting testimony, if possible, so as not to impute perjury to any one. You may, in weighing the testimony, take into consideration the appearances of the witness upon the witness stand, and their manner of testifying. Under the Statute, it is the duty of the court to state its opinion to you upon all questions of law arising in the case, and to submit to your consideration both the law and the facts, without any direction how you shall find your verdict. When you have ascertained what the law is, you are bound by it, the same

as the court is. You have no right to make another law, or to ignore existing law if it does not happen to meet your approval. In that regard, the only question for you is, What is the law? Having ascertained what the law is, you will weigh the testimony, find the subordinate facts, and determine the ultimate fact of the guilt or innocence of the accused.

You may take the papers and retire, and consider your verdict.

Address of Dr. H. W. Wiley, Chemist of the Department of Agriculture, delivered before the National Pure food and Drug Congress, Washington, D. C., March 2, 1898.

Mr. President and Gentlemen:

I am sure you are very much more anxious to complete the organization of this body than to listen to any more addresses. I think the gentleman in the audience voiced the sentiment of the body yesterday in objecting to any further speeches. I will not therefore, occupy a great deal of your time on this occasion. I think, however, that it is due to the bill which is to be discussed here, and to the people who have come from so great a distance, to place before you another aspect of the food adulteration question. You heard yesterday, the expressions of the legislator and of the Master of the National Grange, and of others from their point of view. It will be my object this morning, to express the sentiments or attitude of those who look at this question from a purely scientific point of view. What I shall have to say to you in relation to this subject will be not from a technical, but a chemical point of view. Right at the start I may say there is an exaggerated idea in regard to food adulteration. We heard it stated that perhaps almost every article of food that goes to our table is adulterated. That is true in one sense. There is scarcely any article of food or drug which has not been adulterated, but if you gather from that that every single article of food you live upon is adulterated, it is erroneous. If you look over the reports of the chemists in regard to the adulteration of food, you will find that in most instances that of the whole number of substances examined 25 to 30 per cent. are adulterated. It is not fair to assume that 25 or 30 per cent. of all the substances are adulterated. It is only in the doubtful ones examined that this large percentage of food adulteration is found. Take for example, ordinary wheat flour. There is present, to-day, in this city a number of prominent millers with the object of securing some protection in their business against the adulteration of wheat flour, with flour made from Indian corn, or corn starch.

You may go into the market of this city to-day, and you will probably not find a single case of wheat adulteration. Again we have heard the old story of sand in sugar. That is always something to laugh at. In fact, I doubt if you could find in the whole United States to-day, a single case of this charcter. That such adulterations

do exist, is undoubtedly true, but we ought all to disabuse ourselves of the idea that everything is adulterated, and that every article of food and every article of drink is open to suspicion.

Granting all this, the argument in favor of pure food remains unshaken. There is no doubt of the fact that adulteration is practised to an alarming extent in some branches. I believe that it would be difficult to find an article of food that had not been mixed or adulterated in some way at some time. I think the best way I can present this subject is to show you some of the samples we have examined which were purchased in the open market. The actual article before you is a better argument than any possible explanation could be. Simply at random, because I have not had any time to make any arrangement, I shall show you some kinds of adulteration which have been found in our work, and shall explain in a few words the nature.

In the first place let us look at the canned goods of commerce. There are a great many ways of preserving foods. One way, the most reprehensible is to add to the food some chemical which prevents the activity of the germs which cause decay. All decay of organic bodies is caused by the activity of certain germs. If you can destroy the activity, kill the germs, if you can secure the condition which is unfavorable to their activity the food will be preserved. There are a great many chemical substances which have the power of either destroying the life of the germ, or preventing its development, hence the cheapest and simplest way of preserving foods is by the use of some such substance. The cheapest of these bodies is salicylic acid. This is one of the most ordinary articles employed in liquid bodies, or bodies carrying a large quantity of liquid, as, for instance, preserved green peas, beans, etc. This method is especially practiced with wines, beers and ciders. It is a common thing where these bodies are to be preserved to add salicylic acid or similar substances.

A good place to find these adulterations is in a pure food Exhibition. (Laughter) Many of the articles we have examined were from pure food Exhibits. The instance which I have in view just now—I do not happen to have a sample here—relates to a pure food Exhibit. Not many years ago, I came across an exhibition of unfermented wine, especially designed for invalids and communion services. This Exhibit was advertised as unfermented juice of the grape and had a flaming advertisement saying it was pure and unadulterated. I secured a sample and had it examined, and I do not think I ever in my life found a sample which had so large a percentage of salicylic acid in it. It evidently grew on a peculiar grape vine. This vine grew in the State of New Jersey, and I believe we have some delegates from New Jersey. It was doubtless grafted on a willow. (Laughter.) Not only is it necessary to have the goods preserved but it is equally as essential to preserve the proper color. We find this is especially so with the tomatoes and bodies of that kind, where the color is an important article. Many of you may be surprised to know

how much store is placed upon the color of an article, and rightly so. It is a great thing. We have many coloring matters, and I am not here to condemn the use of them. I believe in coloring, if it is not injurious to health, but if we use a poisonous body, it is different. Probably a few drops of coloring matter are not to be objected to on account of health.

Another instance of color that we have found was in the preservation of peas, and beans. Look at the beautiful green peas and beans, heat them, and put in a can of this kind for awhile, and you will find that the color will fade. This beautiful green will disappear and a yellow color will be seen. These articles are not then so attractive to the appetite, and it is therefore important that this color should be preserved. There is a very effective way of preserving it, by simply adding some substance that will keep from fading. Usually salts of copper are used, and these salts preserve the color. The question is, how far can salts of copper be used with safety? Personally I do not object to taking a little copper. I am not afraid to eat a little of any kind of material. There may be persons who do object to it, and those should be protected against the use of vegetables of this kind, not because they will hurt a strong man, but if you are ill, it may be that the copper will injure you. I can take a dose of salicylic acid and it will not injure me, but it might injure another. I do not think we should forbid the coloring of beans and peas, or other vegetables. I think it is an excellent procedure, but it should be known and stated that such a coloring matter has been used, so that the person who purchases them may know what he is buying. We have determined the actual amount of copper found in these goods and find it not enough to produce any injurious results. From another point of view it may be said that we do not want such goods sent to our foreign markets. Our fruits have been excluded from foreign markets. Our dried fruits have also been excluded on the alleged ground, and perhaps a truthful one, that they contain zinc. Zinc often exists in the soils. Fruits grown on soils containing zinc may actually have zinc in them.

The Department had an investigation, some years ago into this question and found the trays upon which the fruit had been dried contained a less amount of zinc than before the fruit had been placed upon them. It is evident that zinc gets into the dried fruits from the galvanized trays in which they are desiccated. The objection to the introduction of our fruits, based upon the statement that they contained zinc in sufficient quantities to injure health fell to the ground, but it was sufficient to exclude those fruits from several foreign markets.

To remedy this the suggestion was made by the Department that in the future zinc trays be dispensed with altogether. We suggested that the fruit dealers use alluminum trays.

The use of soldering in preserving and the use of lead tops are objectionable. In the contact of the fruit with the lead top, a certain amount of lead is introduced in the preserved goods. Lead is highly

objectionable It has what the physicians term a cumulative effect, so by taking a little at a time, day by day, it accumulates, and finally produces injurious results. Lead in small quantities is objectionable. The law should provide that this substance should not be used in any way about fruit. Solder is often used in a careless way, Little bullets are found in the material, and these may be dissolved, and thus lead is introduced into the contents of the can.

Again the composition of the can itself should be carefully observed. No law in this country, no national or state law, says anything about the material of the package holding the preserved fruit or how it should be made. Usually cans are made of tin, that is, iron covered with tin. Nearly all tins contains lead, some a great deal more than others. We have examined the tinning of a great many cans,and have found as high as 13 per cent of lead (showing a sample.) Entirely too much because a material containing so much lead is very apt to yield a trace or more to the contents of the can. In Europe regulations are enforced in regard to the matter, and I hope some may be introduced into this country. In very many places the use of the tin containing more than 1½ per cent. of lead is prohibited. We should say that the can should be made of tin which is as pure as possible.

In regard to the honey question: Honey is one of the products that is very much adulterated, especially in the liquid state. I do not know the percentage of the adulteration, yet it is large. We have a material which is particularly constituted for the adulteration of liquid honey. It has the same sweet taste,—the liquid glucose. For many years honey has been adulterated with liquid glucose, although the practice is not so general as formerly. It is the very thing to add, and it is so harmless that it is no wonder that it is largely used in the adulteration of honey. This is a material (exhibiting it,) composed nearly altogether of liquid glucose, but glucose is not the only form of adulteration. Chemists can easily detect it. There are other forms of adulteration more difficult to detect. By making a syrup out of sugar cane, and adulterating honey with this article, there is formed a mixture which can be detected only with great difficulty by chemical means, from real honey. There are several ways of effecting this sophistication You can invert the sugar in large quanties in the labratory, or you can feed it to the bees and let them invert it. It is common practice to feed bees during the season when they are not active, on sugar, and I have heard lively discussions about how far that should be practiced. In point of fact what the bees gather on the flowers is nothing but sugar that has been inverted by the natural process.

So whether they get it from the natural process or not, the honey we have is simply inverted cane sugar, which we use every day together with the properties it acquires while in the organism of the bee.

Another thing I find largely adulterated, is salad oil. There is an immense amount of adulteration of this article. Olive oil is perhaps

the best, but sunflower oil will make a most excellent salad dressing. We have examined samples of sunflower oil which I doubt an expert could tell from olive oil. Cotton oil is also good. I do not object to the use of any of these oils for salad dressing, but what I do object to is to pay forty cents for a bottle of this sunflower oil or cotton oil when I think I am buying olive oil.

A great many persons do not like to use pure pepper or pure mustard, they prefer to have it diluted. Manufacturers have therefore assumed from this fact that everybody wants condiments in this shape, so I believe condiments are the most generally adulterated of all food products. I do not think you could go into a hundred stores in this city and buy a hundred samples of condiments, and get 25 of them that are pure and free from adulteration. These fillers (showing them,) are made to imitate the color of the natural condiments. I have no objection to anybody asking for this sample, but do not sell this material for pure pepper and spices. There is where the fraud comes in. Here are colors for preserved meats. (Showing a large number of colors.) Preserved meats of all kinds are quite extensively colored.

Delegate: Are those colors harmless?

Dr. Wiley: I do not know but they are in the proportions in which they are used, but there ought to be no fraud practiced in any manner. Meat should be well ripened. Games and meats ought always to be ripe before they are used. A great many people cook their meats and game immediately after they are killed. That is no way to do. A chicken should be hung up until tender; otherwise it is green. Not long ago I was shown through the most famous restaurant in Boston, where they prepare food that is famous all over the world, and I was told by the proprietor that they never put a piece of meat on the table until they had kept it at least three weeks, and this in addition to the time it had been kept before they got it. You can never have a good piece of beef if you eat it fresh.

The next thing I shall speak of is coffee. We all know that ground coffee and coffee essences often contain things that do not grow on the coffee tree. We are firm in our belief that if we buy the berries themselves we will secure the pure article. I have samples of the supposed coffee berries selected in the open market, and no one of them every saw a coffee tree; all are artificial. We have found as much as 25 per cent. of adulteration in some samples of coffee bought in the open market. Those artificial berries are made in large quantities, and chickory also, is greatly used in adulterating coffee. I do not object in drinking some chickory for breakfast, and the coffee one gets in France is not all coffee. They make there a mixture of chickory and coffee. I like a mixture of that kind, and chickory gives it body and flavor. I think breakfast coffee is greatly improved by the judicious addition of chickory, but we do not want to buy chickory and coffee mixed as pure coffee, because chickory is very

much cheaper. However we ought to use more chickory than we do in this country. Roasted cereals also make good substitutes for coffee.

Delegate: I should like to have you touch upon the subject of tea.

Dr. Wiley We have made a great many examinations of tea. I do not know how many hundreds of samples, and we have only in one or two instances discovered any leaves except tea leaves. One trouble is some of it has been used before we get it. Another trouble is what is called facing. This is done to increase the weight, and improve the color. A substance is added to give color and weight. I do not know whether the custom officials would admit a faced tea or not. I doubt if any considerable quantity of leaves which are not tea leaves is sent into this country. There are parts of the United States where we can grow tea, and we may have a place to grow coffee in the near future, (Applause) I hope we may.

I believe we could grow tea in this country and perhaps we will sometime, in South Carolina especially. Prof. Shepard has been very active in growing tea near Charleston.

The question again is, what can be done from a scientific point of view toward stopping the adulteration of foods. I am not a prohibitionist, but believe in the fullest possible personal liberty compatible with the welfare of society, but I do not want to be dictated to as to what I shall eat or drink. When I do drink, however, if I ever do, I want the government to protect me so that I can drink good whiskey. I do not want to drink poor whiskey. The same is true of eating mixed goods. If I want to eat them, that's my business, but I don't want them forced on me.

The point I make is this, from observation and a careful study of the whole matter, I believe prohibitory measures never prohibit. If we are going to prohibit things we are going to fail. That is the reason that I say in the bill before Congress, the prohibition elements ought to be entirely eliminated. I would be opposed to any prohibitory measure against the manufacture of goods of any description. The law must protect the innocent consumer against imposition of any character. You could not enforce any kind of a law in a country where people are opposed to it. The Pure Food Law must represent the public sentiment of this country, or else it will be a dead letter. One of the objects of this Congress is to consider legislation on a bill already before Congress,—a bill containing many crudities, perhaps, but the objects of that bill will meet the approval of every person here.

There is not a farmer here or one that represents a farming constituency who will not support it. What we want is that the farmer may get an honest market, and the innocent consumer may get what he thinks he is buying. The idea of prohibition is to destroy trade. The object of this bill is to secure honesty, and I do not believe there is a person in Congress who is not in favor of honesty.

MILK.

The present law in regard to milk is as follows :

LAWS TO PREVENT THE ADULTERATION OF MILK.

SECTION 2658. Whoever shall knowingly sell, supply or bring to be manufactured to any butter or cheese manufactory in this State, any milk diluted with water, or adulterated by the addition of any foreign substance, or from which any cream or milk commonly known as strippings, has been taken ; or who shall knowingly bring or supply milk to any butter or cheese manufactory that is tainted or partly sour, shall forfeit not less than twenty-five, nor more than one hundred dollars, with costs of suit, for the benefit of the person or persons upon whom such fraud shall be committed.

SEC. 2659. The usual test for quality and the certificate of analysis of the director of the Connecticut Agricultural Experiment Station, shall be deemed *prima facie* proof of adulteration.

SEC. 2660. No person shall sell, offer or expose for sale any milk from which the cream or any part thereof has been removed, without distinctly and durably affixing a label, tag, or mark of metal in a conspicuous place upon the outside, and not more than six inches from the top of every can, vessel, or package containing such milk, and such metal label, tag, or mark shall have the words "Skimmed Milk" stamped, printed, or indented thereon in letters not less than one inch in height, and such milk shall only be sold or retailed out of a can, vessel, or package so marked.

SEC. 2661. No person shall sell, or offer for sale, or shall have in possession with intent to sell, or offer for sale, any impure or adulterated milk.

SEC. 2662. Every person who shall violate any provisions of the two preceding sections shall be fined not more than seven dollars or imprisoned not more than thirty days, or both.

SEC. 2663. A printed notice of this and five preceding sections shall be conspicuously posted in all public places, creameries or factories where milk is received or sold.

SEC. 2664. Any person who shall knowingly sell, or expose for sale, milk, or any product of milk, from any cow which shall have been adjudged by the Commissioners upon Diseases of Domestic Animals, affected with tuberculosis, or other blood disease, shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

Ordinance of the city of Hartford in regard to the selling of milk.

SEC. 15. It shall be the duty of the milk inspector to inquire into and investigate the quality of milk which may be sold or kept, offered

or exposed for sale, within said city, and he shall make such examinations and inspections thereof as may be necessary to ascertain whether adulterated or impure milk is sold or kept, offered or exposed for sale, within said city, contrary to Statutes of the State of Connecticut, and shall report all violations of said Statutes relating to the sale and adulteration of milk to the prosecuting attorney for prosecution forthwith.

SEC. 16 Said inspector of milk shall for the purposes of the foregoing section, have the power to enter any store, house, building or yard, and upon any premises within said city where milk is sold or kept, offered or exposed for sale, at any reasonable time, to make an examination and inspection as provided in the preceding section, and it shall be lawful for him, for the purposes of inspection and examination, to stop and detain any team, wagon, or vehicle, within said city, which is used in the sale of milk, or for the transportation of milk, which is to be sold or kept, offered or exposed for sale, or to be delivered on sale, and to stop and detain any person carrying milk which is to be sold or kept, offered or exposed for sale, or to be delived on sale.

SEC. 17. Every person who conveys milk in vehicles, or otherwise into the city of Hartford for the purpose of selling the same in said city, or who produces milk within the city limits, for the purpose of selling the same within the city limits, shall annually on the first day of April, or within thirty days thereafter, procure a license from the inspector of milk of said city to sell milk within the limits thereof, and shall pay to said inspector, for the use of said city, the sum of twenty-five cents for every such license. The said inspector of milk shall pay over quarterly to the Treasurer of said city all such sums collected by him.

SEC. 18. The licenses herein provided for shall be issued only in the names of the owners of the vehicles, by means of which the business is carried on, and shall, for the purpose of this chapter, be conclusive evidence of ownership, and no license shall be sold, assigned, or transferred. Each license shall state the name, residence and place of business of the licensee, and the number of carriages or other vehicle used by him in the business; name and residence of every driver or other person engaged in carrying, selling, or delivering said milk for him, and the number of the license.

SEC. 19. Each licensee shall, before engaging in the sale of milk, as aforesaid, cause his name, the number of his license, and his place of business to be placed in legible characters, to the satisfaction of the inspector, in such conspicuous place or places as the inspector may designate, on the outer side or sides of all carriages or vehicles used by him in the conveyance and sale of milk.

SEC. 20. Upon request of the inspector, during the term of his license, any such licensee shall report any change of driver or other person employed by him in the business aforesaid, together with the

name and address of every such substitute driver and employee and of any or all additional employees.

SEC. 21. Said inspector may, at any time after the first day of April in any year, issue licenses in the form and upon the terms herein provided, to continue in force from the date thereof, until the first day of April next, to parties who may begin the business aforesaid after the first day of April in the current year.

SEC. 22. Said inspector shall keep a record of all licenses issued, in a book prepared for that purpose, which shall set forth the matters and things specified in the license, and he shall transmit a duplicate of every license so issued by him, within ten days thereafter, to the Clerk of the Board of Health.

SEC. 23. Any person who shall engage in the business aforesaid without being first licenses as herein provided, or who shall violate any of the provisions of Sections seventeen, eighteen, nineteen and twenty of this Chapter, shall for the first offense, pay a fine not exceeding ten dollars, for the second offense a fine of not less than ten dollars, nor more than twenty-five dollars. and for each subsequent offense shall pay a fine of not less than twenty-five dollars nor more than fifty dollars, and may be imprisoned not more than thirty days.

Ordinance concerning milk in New Haven:

No milk producer, or vender, shall, either himself, or through his agents, or employes, offer, or expose for sale, or sell. or deliver for sale, or consumption within the city. any unclean, impure, unhealthy, unwholesome, or adulterated milk.

The term adulterated milk, when used in this ordinance, shall mean: Milk showing at least two of the three following characteristics, to wit:

a—A specific gravity of less than 1.029, or more than 1.033.

b—Less than three and a half per centum of fat.

c—Less than eleven and one-half per centum of milk solids.

Milk drawn from cows within fifteen days before, or five days after parturition; or

Milk drawn from animals fed on any substance in a state of putrefaction, or on any unhealthy food, or supplied with water which is impure or unwholesome; or

Milk drawn from cows kept in a crowded, filthy, or unclean condition; or

Milk that has been diluted with water, or any other fluid, or which has been added, or into which has been introduced any substance producing any deleterious effect on said milk; or

Milk from which any part of the cream has been removed, unless such milk is sold as "skimmed milk" as hereinafter provided; or

Milk drawn from any animal affected with tuberculosis, or any other form of disease All adulterated milk shall be deemed unclean, unhealthy, impure and unwholesome.

No person licensed under the provisions of this ordinance shall have in his possession with intent to sell, offer or expose for sale, or

sell or deliver for sale, or consumption, in any store, or place of business, or from any wagon, cart, sleigh or other vehicle used in distributing or selling milk, or any milk from which cream has been removed, or milk commonly known as "skimmed milk," without first marking the can or package containing said milk, and from which said milk is delivered to the purchaser or consumer, with the words "skimmed milk" in large, plain black letters, each letter being at least one inch high and one-half inch wide, said words to be on the top or side of said can or package in such a position as to be easily seen when such milk is sold or delivered.

Thirty days after this ordinance shall have become operative, it shall be unlawful for any person to have in his possession, with intent to sell, offer or expose for sale, or sell, deliver for sale, or consumption within this city any milk without having first obtained from the Board of Health a license so to do, which license shall be issued on application in writing to said Board of health, upon blanks provided for such purpose, and on payment to said Board of Health of a license fee of fifty cents. Said license shall not be assignable, shall be effective until the first of May next ensuing, and may be renewed for one year upon its expiration, on application and payment of said fee as aforesaid, but the said Board of Health shall have the right and authority to refuse to license any person who has violated any of the provisions of this ordinance, and may revoke and cancel said license, at any time for a violation of the provisions of this ordinance.

Each licensee shall, before engaging in the sale of milk, cause the name and number of his license to be legibly placed and kept in a conspicuous place on the outer side of all carriages, wagons, carts, sleighs or other vehicles used by him in the conveyance and sale of milk.

In order to carry out the provisions of this ordinance, the officials, inspectors and employees of the Board of Health shall have the right at any and all times to enter upon and into the premises of any producer or vender of milk licensed under the provisions of this ordinance, and any refusal upon the part of said producer or vender to allow such entry and inspection as may be required and directed by the Board of Health may be followed by the revocation of the license of such producer or vender by said Board of Health.

Any milk producer or vendor to whom a license for the sale of milk has been refused, or whose license has been canceled or revoked, as provided in this ordinance, who shall hereafter offer, or expose for sale, sell or deliver for sale or consumption within said city, any milk shall be subject to the penalties provided by this ordinance.

The officials, inspectors or employees of the Board of Health shall have the right to enter upon and inspect all places and premises from which milk is sold and in which milk is stored, and to board all carriages, wagons, carts, sleighs or other vehicles from which milk is sold or delivered, and to take therefrom samples for analysis, and any person who hinders or obstructs such officials, inspectors or employees,

while in the discharge of their duties, shall be subject to the penalties provided in this ordinance.

Any person violating any provisions of this ordinance shall upon conviction thereof be punished by a fine of not less than ten dollars, nor more than one hundred dollars.

Milk ordinance adopted by the Council of the City of Norwalk :

Be it Enacted by the Council of the City of Norwalk :

SECTION 1. On and after the 1st day of August, 1898, no person by himself, his servant or agent, and no corporation, by its servant or agent shall sell any milk or cream in the city of Norwalk, without first obtaining a permit therefor, as hereinafter provided.

SEC. 2. Every person or corporation desiring to sell milk or cream in the city of Norwalk, shall make application for a permit to the Board of Health, agreeable to forms to be furnished by the board, which application shall be accompanied by a certificate from the State Commissioner on Domestic Animals, showing that he has, within thirty day, examined the cows which are to produce the milk to be sold under such permit, and finds no existence of disease dangerous to public health ; and with a request that the board, or its agents or inspectors, or the Health Officer, inspect the dairy and cows from which the milk and cream is to be obtained, for the purpose of ascertaining the sanitary condition of such dairy, and the health of such cows.

SEC. 3. The Board of Health, or its agents or inspectors, or the Health Officer, shall inspect the dairy and cows of every applicant for a permit to sell cream or milk within the city, agreeable to the request of the applicant ; and when the applicants shall have caused to be removed all animals or cows found to be affected with diseases dangerous to public health, and shall have caused to be removed all causes which, in the opinion of the Board of Health, or the Health Officer, endanger or render unhealthy the milk supply from said dairy, and shall have conformed to the said requirements of the application form provided by the Board of Health, a permit shall be issued to such applicant.

SEC. 4. Such permits shall be issued for a term not to exceed one year and shall specify the time for which it is issued, the name of the applicant, and the number of the permit. The number of the permit, preceded by the words "Health Department Permit," must be carried on the left side of every wagon or vehicle delivering or peddling milk or cream, in letters two inches in length, colored to contrast with the color of the wagon. In all stores in which cream or milk is sold, the permit shall be kept in a conspicuous place.

SEC. 5. Every person by himself, his servant or agent, and every corporation, by his servant or agent, engaged in producing or selling cream or milk in this city, shall report to the Board of Health every

case of the following diseases which may occur in persons or families of those engaged or employed in producing or selling milk or cream : Small pox, typhoid fever, scarlet fever, chronic diarrhœa, diphtheria, membraneous croup, folicular tonsilitis.

SEC. 6. The Board of Health shall have the right to revoke any permit to sell milk or cream within the city, whenever, in the judgment of the board, such revocation may be necessary to protect the public health.

SEC. 7. Any persons who shall violate any of the foregoing provisions of this ordinance, shall pay a fine or penalty not to exceed the sum of $100 for each offense.

SEC. 8. The Board of Health shall keep a complete record of all proceedings and inspections required by this ordinance.

Approved July 1 th, 1898.

C. L. GLOVER,
Mayor.

Milk ordinance adopted by the Council of the City of South Norwalk this 27th day of December, 1897.

SECTION 67. The Board of Health or any member thereof, or the health officer or the inspector shall have full power to enter, from time to time, any premises or vehicles of any persons who shall carry, keep or expose or offer ice or milk for sale, to inspect said ice, or to obtain samples of said milk, which milk shall be subjected to an analysis by a competent chemist, who shall be designated by said Board of Health.

The compensation of said chemist for such analysis shall be fixed by said Board of Health.

SEC. 78. Every dealer in milk, who uses in his business a wagon, cart, or other vehicle, shall have or keep upon such conveyances a covering of canvas or other material to protect the contents from the rays of the sun, and the dirt and the dust of the street, provided there is no top to said conveyance, no blankets or cloths, except a lined canvas jacket for each can.

SEC. 79. No dealer in milk by himself, nor his agents, shall sell or have with intent to sell, milk from which the cream has been removed in part or in whole, unless sold as skim milk, and unless in a conspicuous place on both sides of the vehicle, from which such milk is sold the words "Skimmed Milk" are distinctly and legibly made in letters not less than one inch in height.

SEC. 80. No dairyman who shall feed to his milch cows or have in his possession with intent to feed to such cows any garbage, refuse or other improper food, shall sell or offer for sale to any dealer or other resident of the city of South Norwalk, the milk from such cows, nor shall any such dealer knowingly receive or sell any milk produced from said dairy. Nor shall the milk of cows which may be kept in

any place where the water, ventilation, food and surroundings are not wholesome and sufficient for the preservation of their health, safe condition and the wholesomeness of their milk, be sold within the city limits.

SEC. 81. The Board of Health may appoint some suitable and competent person to make such inspection, and any person so appointed shall have the power to enter upon any premises for the purpose of discharging the duties of his office, and any person who shall resist or obstruct said officer, or who, after notice, shall neglect to comply with any order of the Board of Health, under this ordinance, shall forfeit and pay a fine not to exceed fifty dollars for the use of the city.

EXPENSES FOR THE YEAR ENDING SEPTEMBER 30, 1898.

Dairy Commissioner, Salary, - - -	$1,500 00
Office and Travelling expenses, - - -	644 46
Deputy Dairy Commissioner, Salary, - -	1,200 00
Travelling Expenses, - - - - -	637 18

CONCLUSION.

During the year past the Commission has earnestly endeavored to carry out the provisions of the various laws placed under its charge. All parts of the State have been visited, the stores in every city and in a large number of the towns have been examined, and the foods which come under this department have been tested. Bakeries and boarding houses have been inspected to see if they comply with the law. A large number of samples have been taken and tested, and several hundred as already stated have been sent to the Experiment Station for more accurate analysis. A large amount of time has been devoted to the execution of the law relating to the sale of imitation butter.

The justice of this law to both producers and consumers of dairy products in our State has been most clearly shown. Without such a law our markets would be flooded with a manufactured product, and consumers would in many cases know very little about what they were purchasing. There is a need of constant watchfulness under the law to protect our citizens against this fraud.

The Tub Butter law passed the last session of the Legislature has in most cases proved a good law, and dealers throughout the State are generally conforming to it.

The law in regard to the sale of adulterated molasses has proved itself to be a good one, satisfactory alike to dealers and

consumers, as shown by that part of the report relating to this law. The enforcement of it has worked for good throughout the State, and the percentage of adulterated molasses sold during the last year has materially decreased.

The Vinegar law is one which is of great interest to the people of the State. There are large quantities of vinegar used, and most people desire a pure article, and not one made from acid and water with some coloring matter added. The Connecticut law is very similar to that in many other States, some of them having a stronger law than our own. This law also protects the manufacturers of pure cider vinegar of the State; this is quite a large industry and can be made more so, with cheap acid vinegar out of the market.

Pure food laws are being passed in nearly every State. A National Pure Food Congress was held in Washington last winter to consider and take action upon this subject, and a National Association of State Dairy and Food Departments has been organized to help carry on the work. People are aroused over the amount of adulteration in food products, and are desirous of doing something to stop it. Consumers of pure food in Connecticut can take great satisfaction in the legislation of our own State since 1866, upon this subject.

I would take this occasion to renew my expression of sincere thanks to all the court officers of the State for the hearty support which has been given to this department during the year, and to the officers of the Connecticut Experiment Station for the co-operation which they have shown in all the work of this department. To the Dairymen's Association; to the Creamery Association, and to the cordial support which has been given by the people all over the State.

Respectfully submitted,

JOHN B. NOBLE,

Dairy Commissioner.

State of Connecticut.

REPORT

OF

COMMISSIONER

— ON —

DOMESTIC ANIMALS

FOR

Year Ending September 30, 1898,

— AND —

LAW RELATING THERETO.

E. H. COOK, PRINTER,
ANDOVER, CONN.

REPORT.

To His Excellency, Lorrin A. Cooke, Governor:

Sir: As required by the provisions of Chapter CXCIX, Public Acts of 1897, I have the honor to submit herewith my report for the fiscal year, ending September 30th, 1898.

Early in the session of the General Assembly of 1897, the law relating to Diseases of Domestic Animals was suspended, owing to the feeling existing against it throughout the State, and on the 2d day of June the present law was approved, and went into effect July 15th, 1897, and is as follows, viz.:

State of Connecticut.

CHAPTER CXCIX, PUBLIC ACTS 1897.

An Act in Relation to Domestic Animals.

SECTION 1. When any person shall bring any cattle from an adjoining state into this State, he shall, within six days thereafter, notify the Commissioner on Domestic Animals hereinafter appointed, and such notice shall contain the number and sex of such animals, and a true statement of their physical condition. Every person who shall knowingly violate any of the provisions of this section shall be fined not more than fifty dollars.

SEC. 2. When any contagious disease exists among domestic animals in this State, said Commissioner may quarantine all animals infected with a contagious disease and prohibit the sale of all the products thereof; but no animal shall be quarantined that does not give evidence of disease by competent physical examination, and no animal shall be quarantined for more than thirty days.

SEC. 3. If it shall appear to said Commissioner that it would be for the good of the State that animals so quarantined should be destroyed, he may cause said animals to be killed; but no animal so quarantined shall be killed until its value has been adjudged by the owner and the Commissioner, and if they cannot agree each shall choose a representative, who shall choose a third, and the three so chosen shall determine the value of the animal, and the value thus determined shall, when approved by the Commissioner, be paid to said owner by the State, upon the order of the comptroller. But no animal whose physical condition indicates that it is of no real value, and no animal that has not been in this State six months prior to its quarantine, shall be paid for by the State.

SEC. 4. The Commissioner shall, at the request of the owner of any domestic animal or animals in this State, inspect the same by physical examination, and if he find them free from disease dangerous to the public health, he shall so certify to the owner.

SEC. 5. It shall be the duty of the selectmen in each town to report to the Commissioner any animals infected with contagious disease.

SEC. 6. For the purpose of carrying out the provisions of this act, the Governor shall biennially appoint a Commissioner on Domestic Animals, who shall be a practical farmer and stock-breeder of at least ten years' experience. Said Commissioner shall receive a salary of fifteen hundred dollars per annum and his expenses, while performing the duties of his office; he shall hold his office for the term of two years from and after the date of his appointment, and he may, with the approval of the Governor, employ such assistants as may be necessary to discharge the duties of his office, and any expense so incurred shall be paid by the State upon the approval of the Governor, and said Commissioner shall annually report to the Governor concerning his acts and expenses.

SEC. 7. Sections 1699, 1700, 1701, 1702, 1703, 1707 and 1709, of the General Statutes, and Chapter CCLXXXVIII of the Public Acts of 1895, and all acts or parts of acts inconsistent herewith are hereby repealed.

Approved, June 2, 1897.

This law was the result of the united efforts of prominent dairymen all over the State, and it protects the consumer as well as the producer, and has done much to harmonize their interests, as is shown by the increased consumption of that most nutritious food, milk.

The general health and condition of our dairy animals throughout the State is good, and I doubt if any state in the Union can show a finer class of cows than Connecticut. While Connecticut is a small State, it is estimated that there are 137,000 milch cows and about 70,000 other cattle in the State, and it would be strange if there was not some disease existing among them. As the law provides for but one Commissioner, and he being subject to the call of dairymen all over the State, he is kept busy, and at times has been unable to respond as promptly as might be desired. A large number of cattle have been examined during the year and 71 were condemned, all but four of which were suffering from tuberculosis. This shows tuberculosis to be the most prevalent disease, still it does not prevail to any alarming degree, and with the co-operation of the farmers throughout the State, under the present law, it can be held in check and need cause no unnecessary alarm.

Any one owning an animal suspected of being diseased has the right to call the Commissioner at the expense of the State, and if after an examination it is thought best to destroy the animal, the owner will get pay for it according to what its physical condition represents it to be worth at the time it is condemned. The one that feeds and cares for the animals daily is the best judge of their physical condition, and the first to detect symptoms of disease. A cough should be recogniz-

ed as a dangerous symptom of tuberculosis, still, not every animal that coughs has tuberculosis.

The tuberculin test for detecting the disease has been entirely discarded by the State.

There seems to be a general satisfaction with the present law and a willingness on the part of stock owners to comply with its provisions. The dairymen throughout this State are an intelligent class of men who make a thorough study of their business and are becoming better educated each year in the care and treatment of their stock and product. A marked improvement is everywhere noticable among milkmen as to the sanitary conditions surrounding their stables and milk-rooms, and a general willingness to have their premises inspected and to comply with suggestions as to improved methods; but they will not readily submit to unnecessary, arbitrary and expensive dictation, no more than the milkmen around Portland, Maine, did last year.

Early in the spring of 1897, the Portland Board of Health, acting under a city ordinance, and without any consultation with the Board of Cattle Commissioners, issued, "Rules and Regulations" by which they were to enforce compulsory tuberculin tests of all cows furnishing milk for the city of Portland. This order met with a most pronounced protest from the milk producers, who organized a "Milk Producers' Union," with 107 members, and a milk famine in Portland was averted only by the Board of Health receeding from their position demanding tuberculin tests.

While all other New England states maintain a quarantine, subject to a tuberculin test against cattle from other

states, they seem to have followed the example of Connecticut and called a halt on the indiscriminate slaughter of all cattle that respond to that test.

During the year many object lessons of a very interesting character have presented themselves. In one case the Commissioner was called to examine a herd recently tested with tuberculin, where no animal responded to the test, and he condemned one upon a physical examination, and a *post mortem* showed tuberculosis very plainly.

In another case where a herd had been tested with tuberculin one of the finest looking animals responded, and the Commissioner was called and asked to pay for the animal if a *post mortem* revealed tuberculosis. Of course he could not do that under the present law. The animal was killed and a very careful examination by a competent veterinarian, who made the test, failed to show the slightest trace of tuberculosis or any other disease.

Last January a cow with her calf a few days old was shipped out of the State. This cow was taken out of a comfortable stable and placed in a car, and owing to a delay did not reach her destination until the next day, and when removed from the car the temperature was 14° below zero. She was subjected to the tuberculin test and condemned and ordered killed or returned to Connecticut. Being consulted, I suggested that the cow and calf be returned, and the calf was fattened upon its mother's milk, and when eight weeks old, assisted by a competent veterinarian, we killed the calf and made a thorough search for signs of disease, but found none. The cow to-day is in fine condition and one of the best cows in Connecticut.

During the year many large dairies have been inspected, and it is pleasing to note the large number of new barns with convenient stables and milk-rooms.

Without detracting in the least from the many large and fine barns, supplied with modern conveniences, located in all parts of the State, particular mention might be made of Mr. R. E. Holmes, Winsted, who perhaps has the largest and best equipped plant in the State for producing and handling milk. His dairy comprises about 100 cows, and the product is all sold in Winsted in the form of whole milk, skimmed milk and cream. The cows are all stabled on one floor, which is light and airy and kept scrupulously clean. The milk, as soon as drawn, is taken to an annex where it is passed over an aerator to cool it, or through a separator to skim it, when it passes to the bottling room below, then to the cold storage, where it remains until taken to the consumer, all of which is done with the least possible labor. A visit to this farm should well repay any one contemplating dairying on a large scale.

EXPENSES.

Salary as Commissioner,	$1,500 00
Traveling Expenses,	446 28
Clerk,	208 00
Services and Expenses of Veterinarians,	87 94
Telephone and Telegraph,	31 56
Stationery, Printing and Postage,	36 05
Sundries,	8 10
	$2,317 93
Number of Cattle Condemned, 71.	
Paid for Condemned Cattle,	$1,062 50
Total,	$3,380 43

Under "Estimates for State Expenditures" for two fiscal years ending June 30th, 1899, submitted by the State Treasurer, December 1st, 1896, this department calls for $66,000, or $33,000 for each year. This report shows a saving of $29,619.57 to the State treasury in one year, which may be considered as only a small part of the benefit derived by the State under the new law.

During the year there has been reported as having been brought into the State 5,183 animals. Blanks for convenience of making these reports will be furnished upon application.

In conclusion, I wish to express my appreciation for the courteous treatment received from all and hearty co-operation extended by dairymen and farmers throughout the State, and to many physicians, veterinarians and others who have taken an interest in the work of this department, and assure them that I am simply their servant at their command.

Respectfully submitted,

WM. B. SPRAGUE,
Commissioner.

Office with Dairy Commissioner, Room 54,
Capitol, Hartford.
Residence, Andover.

CORRECTIONS.

Page 17. Eighth line from the bottom, after *than* insert $\frac{1}{12}$.

Page 36. Ninth line from top, for *10596* read *10569*.

Page 40. In the fourteenth line from the bottom, for *good* read *food*.

Page 73. The guaranteed percentage of potash in Chittenden's potato phosphate No. 10355 is *eight* per cent. not *ten* per cent. as given in the table.

Page 124. For W. F. Wackley, Middletown, read W. F. Ackley.

Page 220. In the heading and also in second line under Vinegar, for *1897* read *1898*.

STATE OF CONNECTICUT

TWENTY-SECOND ANNUAL REPORT

OF

The Connecticut Agricultural Experiment Station

FOR 1898.

Printed by Order of the General Assembly

The publications of this Station are sent free to every citizen of Connecticut who applies for them. Address, The Conn. Agricultural Experiment Station, New Haven, Conn.

HARTFORD, CONN.
PRESS OF THE CASE, LOCKWOOD & BRAINARD COMPANY.
1899.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION.

OFFICERS AND STAFF FOR 1898.

STATE BOARD OF CONTROL.

Ex officio.

His Excellency LORRIN A. COOKE, *President.*

	Term expires.
Appointed by Connecticut State Agricultural Society:	
S. M. WELLS, Wethersfield.	July 1, 1900
Appointed by Board of Trustees of Wesleyan University:	
Prof. W. O. ATWATER, Middletown.	1900
Appointed by Governor and Senate:	
EDWIN HOYT, New Canaan.	1901
JAMES H. WEBB, Hamden.	1899
Appointed by Board of Agriculture:	
T. S. GOLD, West Cornwall, *Vice-President.*	1901
Appointed by Governing Board of Sheffield Scientific School:	
W. H. BREWER, New Haven, *Secretary and Treasurer.*	1899
Ex officio.	
S. W. JOHNSON, New Haven, *Director.*	

Executive Committee.

Station Staff.

Chemists.

S. W. JOHNSON, *Director.*
E. H. JENKINS, Ph.D., *Vice-Dir.*
A. L. WINTON, Ph.B.
T. B. OSBORNE, Ph.D.
A. W. OGDEN, Ph.B.
G. F. CAMPBELL, Ph.B.
W. L. MITCHELL, Ph.B.

Mycologist.

WILLIAM C. STURGIS, Ph.D.

Horticulturist.

W. E. BRITTON, B.S.

Grass Gardener.

JAMES B. OLCOTT, South Manchester.

Stenographer and Clerk.

Miss V. E. COLE.

In charge of Buildings and Grounds.

CHARLES J. RICE.

Laboratory Helpers.

HUGO LANGE. WILLIAM POKROB.

Sampling Agent.

V. L. CHURCHILL, New Haven.

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Announcement.

The Connecticut Agricultural Experiment Station was established in accordance with an Act of the General Assembly approved March 21, 1877, "for the purpose of promoting Agriculture by scientific investigation and experiment."

The Station is prepared to analyze and test fertilizers, cattle-food, seeds, milk, and other agricultural materials and products, to identify grasses, weeds, moulds, blights, mildews, useful or injurious insects, etc., and to give information on various subjects of Agricultural Science, for the use and advantage of the citizens of Connecticut.

The Station does not undertake sanitary analyses of water.

The Station makes analyses of Fertilizers, Seed-Tests, etc., for the citizens of Connecticut, without charge, provided —

1. That the results are of use to the public and are free to publish.

2. That the samples are taken from stock now in the market, and in accordance with the Station "Instructions for Sampling."

3. That the samples are fully described and retail prices given on the Station "Forms for Description."

The officers of the Station will take pains to obtain for analysis samples of all the commercial fertilizers sold in Connecticut; but the organized coöperation of farmers is essential for the full and timely protection of their interests. Granges, Farmers' Clubs, and like associations can efficiently work with the Station for this purpose, by sending in duly authenticated samples early during each season of trade.

☞ By a recent Act of Legislature it is made the business of this Station to examine articles of food and drink on sale in Connecticut, with reference to their adulterations.

Here it may be stated that, *until further notice*, the Station will examine only such samples of food and drink as are collected by its agents or such as shall be taken under its advice, and by the methods it shall prescribe or approve.

All other work proper to the Experiment Station that can be used for the public benefit will be done without charge. Work for the private use of individuals is charged for at moderate rates. The Station undertakes no work the results of which are not at its disposal to use or publish, if deemed advisable for the public good.

Results of analysis or investigation that are of immediate general interest are published in Bulletins, copies of which are sent to each Post Office in the State, and to every citizen of the State who applies for them. The results of all the work of the Station are summed up in the Annual Reports made to the Governor.

It is the wish of the Board of Control to make the Station as widely useful as its resources will admit. Every Connecticut citizen who is concerned in agriculture, whether farmer, manufacturer, or dealer, has the right to apply to the Station for any assistance that comes within its province to render, and the Station will respond to all applications as far as lies in its power.

☞ Instructions and Forms for taking samples, and Terms for testing Fertilizers, Seeds, etc., for private parties sent on application.

☞ Parcels by Express, to receive attention, should be *prepaid*.

☞ Letters sent to individual officers are liable to remain unanswered in case the officer addressed is absent. All communications therefore should be directed simply to the

AGRICULTURAL EXPERIMENT STATION,
NEW HAVEN, CONN.

and all remittances should be made payable to the undersigned.

☞ Station Grounds, Laboratories, and Office are on Huntington Street, five minutes walk west from Whitney Avenue and $1\frac{5}{8}$ miles north of City Hall.

☞ Huntington Street may be reached by Whitney Avenue Electric Cars, which leave the corner of Chapel and Church Streets five times hourly, viz.: on the striking of the clock and at intervals of twelve minutes thereafter.

☞ The Station has telephone connection and may be spoken from the Central Telephone Office, 118 Court Street, or from Peck & Bishop's Office in Union R.R. Depot, New Haven.

☞ The Grass Garden, in charge of Mr. James B. Olcott, is near South Manchester, five minutes walk from the line of the Manchester Electric Cars, leaving City Hall Square, State Street, Hartford, every half hour. Conductors on this line can direct visitors to the Garden.

S. W. Johnson, *Director*.

Report of the Board of Control.

To his Excellency, George E. Lounsbury, Governor of Connecticut:

The Board of Control of the Connecticut Agricultural Experiment Station herewith submits its Report for the year ending October 31st, 1898:

The Fertilizer Control.

During the months of April, May, and June, Mr. V. L. Churchill, sampling agent of this Station, visited one hundred and twenty-nine towns and villages of Connecticut and drew seven hundred and seventy-six samples, representing two hundred and eighty-four of the two hundred and eighty-nine brands of commercial fertilizers which have been entered at the Station for sale in this State.

Analyses of samples of all these brands have been made in the chemical laboratory by Messrs. Winton, Ogden, and Mitchell, with the assistance of Mr. Lange.

A manuscript copy of each analysis has been sent to the manufacturers and to each dealer from whom a sample of the goods analyzed was taken.

The chemists named have also analyzed two hundred and eighty-five other samples of fertilizers and manurial waste products, making the total number of fertilizer analyses five hundred and sixty-nine.

A full account of the results of this work is given in Part I of the Report of the Station Staff.

Examination of Food Products.

One thousand and forty-eight samples of food products, the larger part of them bought by our sampling agent in open market, have been examined with reference to adulterants, by Messrs. Winton, Ogden, and Mitchell. A full account of this work and its results forms Part II of the Report of the Station Staff.

Nine samples of cattle foods have also been chemically and microscopically examined.

Work for the Dairy Commissioner.

All the chemical work required by the Dairy Commissioner has been done in the laboratory of this Station, including two hundred and three examinations of molasses, four of syrup, thirty-two of vinegar, seventeen of butter and imitation butter, and four of cream. Expert evidence has also been given in court when required.

Other Chemical Work.

In connection with work on the availability of different kinds of fertilizer-nitrogen, the chemists have made partial analyses of two hundred and twenty-one samples of turnips, Hungarian grass, red-top, and buckwheat; also fourteen samples of soil.

Considerable work has been done in the study of certain methods of quantitative analysis, which has included fifty determinations of nitrogen, forty-four of phosphoric acid, and thirty-six of potash, as well as a large number of determinations of nicotine, the alkaloid of tobacco.

Study of Proteids.

Dr. Osborne, with the assistance of Mr. Campbell, has made, during the year, an investigation of the proteids of wheat germs.

He has also devoted much labor to a closer study of several of the plant proteids described in former Annual Reports of this Station, and has taken up the investigation of egg-albumin.

It has been found that all proteid preparations contain small amounts of hydrochloric and sulphuric, or other acids, chemically combined to the proteid substance. Evidence has been obtained that *edestin*, for example, forms a series of definite compounds with acids, and the properties and composition of these compounds are being studied.

Some results of this work are ready for publication.

Seed Testing.

Three hundred and thirty-three samples, chiefly of vegetable seeds, have been tested as to their vitality and germinative power, in the interests of seedsmen and purchasers.

Mycological Work.

The investigations of Dr. Sturgis during the last Station year have included a study of three Diseases of Melons, viz.: "Wilt,"— a bacterial disease, — Black Mold, and Leaf Burn, with field experiments to test preventive measures; also field experiments on the prevention of the Mildew of Lima Beans; preliminary notes on the "Calico" and the Natural Spotting of Tobacco; and much miscellaneous work on questions referred to him by correspondents throughout the State.

On September first Dr. Sturgis went to Europe, having been given six months' leave of absence, for the purpose of further study in his special department.

Horticultural and Entomological Work.

The study of the relative availability of organic nitrogen in various forms has been continued by Dr. Jenkins and Mr. Britton, with the coöperation of the Station chemists. Sixty-two cultures of red-top grass, sixty-two of turnips, thirty of Hungarian grass, forty-eight of privet, and fourteen of buckwheat have been made for this purpose, in galvanized iron pots charged with a natural soil, to which the several forms of nitrogenous plant-food had been added.

During the winter fifty comparative cultures of tomatoes, twelve of carnations, and ten of lettuce were made, on the one hand in rich compost, and on the other in a mixture of coal ashes, peat, and varying amounts of fertilizers. These cultures were made on the benches of the forcing houses to study the fertilizer requirements of these crops which are now grown extensively under glass.

Mr. Britton has also given attention to the grafting of chestnuts to determine the proper season and the best methods of setting chestnut cions in this State. Over two hundred cions were set at different times between April 20th and June 20th, in four separate places in and about New Haven.

The observations on the growth of forest-tree seedlings have been continued in coöperation with the Division of Forestry, U. S. Department of Agriculture.

In connection with the Section of Seed and Plant Introduction of the above-mentioned Department, forty-seven imported plants are being tested as to their value for cultivation in this country.

The Entomological work of the Station, which has considerably increased of late, has been done by Mr. Britton. Besides the correspondence and determination of insect species referred to the Station by correspondents, special attention has been given to a study of the San José scale; its present distribution in this State, its spread from infected places, and the effects of kerosene and other insecticides upon the scale, and also upon the trees to which they are applied.

Several States to which Connecticut nurserymen are shipping nursery stock have passed laws forbidding entry into those States of stock from nurseries which have not been inspected within the year, and requiring with each shipment a certificate of inspection. In response to requests from our nurserymen, Mr. Britton has made eleven inspections of nurseries, and in eight cases has given the desired certificate.

The method of banding trees to keep off canker worms, and the best substances to use on the bands, has also been studied.

Field Experiments.

Under the supervision of Dr. Jenkins, the three experiments on the fertilization of peach orchards, begun in 1896, chiefly to study the effects of different amounts of potash salts and of the forms of nitrogen best adapted to the crop, have been continued, but the account of them is reserved until further data are secured.

Tobacco Experiments.

Under the direction of Dr. Jenkins, the curing of wrapper tobacco by artificial heat and the fermentation of this tobacco in bulk, instead of in case, have been studied during the year. For this purpose, a new experimental tobacco barn was built at Windsor to replace the one destroyed by fire last year.

Station Publications.

The Twenty-first report of this Station, for the year 1897, a volume of 418 pages, has been issued in an edition of 7,000 copies. These have been distributed, after satisfying our exchanges, among the farmers of this State in response to applications.

Of the Second Annual Report on Food Products, 10,000 extra copies were printed at the expense of the Station, and

distributed in our cities and villages to intelligent citizens who are, presumably, interested in pure food but are not reached by the regular edition that is intended for the use of agriculturists.

Bulletin No. 125, issued in April last, sixteen pages, was entitled "Preparation and Application of Fungicides."

Bulletin No. 126, twelve pages, entitled "Insecticides; Their Preparation and Use," and Bulletin No. 127, ten pages, entitled "The Cast of Plant-Food in Connecticut, Spring Months of 1898," were issued in May, 1898.

Five thousand copies of each bulletin were printed and distributed.

Bulletins 125 and 126 are not reprinted in this Annual Report.

Correspondence.

During the year three thousand two hundred and eighty-six letters and manuscript reports of fertilizer and other analyses have been written on Station business.

Meetings of the Board.

During the year ending October 31st the Board of Control has held three meetings.

All of which is respectfully submitted.

Wm. H. Brewer, *Treasurer.*

REPORT OF THE TREASURER.

Wm. H. Brewer, in account with The Connecticut Agricultural Experiment Station for the fiscal year ending September 30, 1898.

RECEIPTS.

Balance from 1897,	$3.14	
State Appropriation, Agriculture,	10,000.00	
State Appropriation, Food,	2,500.00	
United States Appropriation,	7,500.00	
Analysis Fees due 1897,	3,550.00	
Analysis Fees due 1898,	3,095.00	
Miscellaneous,	127.57	
		$26,775.71

DISBURSEMENTS.

S. W. Johnson,	$1,250.00
E. H. Jenkins,	2,500.00
W. H. Brewer,	433.32
V. E. Cole,	766.67
W. C. Sturgis,	2,000.00
T. B. Osborne,	1,700.00
A. L. Winton,	1,700.00
A. W. Ogden,	1,600.00
G. F. Campbell,	966.67
W. L. Mitchell,	825.00
H. Lange,	714.99
J. B. Olcott,	800.00
W. E. Britton,	1,100.00
C. J. Rice,	600.00
V. L. Churchill,	600.00
Labor,	911.60
Publications,	580.93
Postage,	155.77
Stationery,	235.47
Telephone and Telegraph,	117.77
Freight and Express,	78.88
Coal,	847.80
Gas,	357.50

Water,	$147.00	
Laboratory Supplies,	1,288.71	
Agricultural and Horticultural Supplies,	72.48	
Miscellaneous Supplies,	161.40	
Fertilizers,	102.39	
Feeding Stuffs,	100.37	
Library,	764.60	
Tools and Machinery,	77.10	
Furniture and Fixtures,	57.49	
Scientific Apparatus,	72.32	
Live Stock,	40.00	
Traveling Expenses of the Board,	60.91	
Traveling Expenses of the Staff,	156.64	
Tobacco Investigation,	1,501.13	
Fertilizer Sampling,	322.98	
Food Sampling,	244.65	
Unclassified Sundries,	20.25	
Repairs,	382.77	
Betterments,	78.77	$26,494.33
Balance to New Account,		281.38
		$26,775.71

Memorandum.—The accounts of the Treasurer have been duly audited by the State Auditors of Public Accounts, and the Report of the Treasurer for the fiscal year of the United States ending June 30, 1898, was duly rendered to the United States Secretary of the Treasury and the Secretary of Agriculture in July.

In the accounts as here written the disbursements for "Fertilizers" are exclusive of those used in the special Grass and Tobacco investigations, and those for "Traveling Expenses of the Staff" are exclusive of those used in the said investigations and also those used in the sampling of Foods and Fertilizers.

WM. H. BREWER,
Treasurer.

COMMERCIAL FERTILIZERS.

During 1898 fifty-four manufacturing firms have entered for sale in this State two hundred and eighty-nine distinct brands of fertilizers, viz.:

Special manures for particular crops,	106
Other nitrogenous superphosphates,	114
Bone manures and "bone and potash,"	38
Chemicals, including fish, tankage, and castor pomace,	31
	289

The duties of this Station regarding fertilizers are prescribed by law as follows:

THE FERTILIZER LAW OF CONNECTICUT.

The General Assembly, in 1882, passed an act concerning Commercial Fertilizers, which, as amended in 1893, is now in force.

Attention is especially called to the following requirements of the law, the full text of which is printed on pages 3 and 4.

1. In case of *all* fertilizers or manures, except stable manure and the products of local manufacturers of less value than ten dollars a ton, the law holds the SELLER responsible for *affixing a correct label or statement* to every package or lot sold or offered, as well as for the *payment of an analysis fee* of ten dollars for each fertilizing ingredient which the fertilizer contains or is claimed to contain, *unless* the MANUFACTURER OR IMPORTER has provided labels or statements and has paid the fee. Sections 4005 and 4007.

The Station understands "the fertilizing ingredients" to be those whose determination in an analysis is necessary for a valuation, and which are generally Nitrogen, Phosphoric Acid, and Potash. The analysis fees in case of any fertilizer will, therefore, usually be ten, twenty, or thirty dollars, according as one, two, or three of these ingredients are contained or claimed to exist in the fertilizer.

2. The law also requires, *in the case of every commercial fertilizer*, that a *sealed sample* shall be deposited with the Director

of the Station by the MANUFACTURER OR IMPORTER, and that a *certified statement* of composition, etc., shall be filed with him. Section 4006.

A statement of the per cent. of Nitrogen, Phosphoric Acid (P_2O_5), and Potash (K_2O), and of their several states or forms, will suffice in most cases. Other ingredients may be named if desired.

In all cases the per cent. of *nitrogen* must be stated. Ammonia may also be given when actually present in ammonia salts, and "ammonia equivalent to nitrogen" may likewise be stated.

The per cent. of soluble and reverted phosphoric acid may be given separately or together, and the term "available" may be used in addition to, but not instead of, soluble and reverted.

The percentage of insoluble phosphoric acid may be stated or omitted.

In case of Bone, Fish, Tankage, Dried Meat, Dried Blood, etc., the chemical composition may take account of the two ingredients, Nitrogen and Phosphoric Acid.

For Potash Salts give always the per cent. of Potash (potassium oxide): that of Sulphate of Potash or Muriate of Potash may also be stated.

The chemical composition of other fertilizers may be given as found in the Station Reports.

3. It is also provided that EVERY PERSON in the State, who sells *any commercial fertilizer of whatever kind or price*, shall annually report certain facts to the Director of the Experiment Station, and on demand of the latter shall deliver a sample for analysis. Section 4008.

4. All "CHEMICALS" that are applied to land, such as Muriate of Potash, Kainite, Sulphate of Potash and Magnesia, Sulphate of Ammonia, Nitrate of Potash, Nitrate of Soda, etc.—are considered to come under the law as "Commercial Fertilizers." Dealers in these chemicals must see that packages are suitably labeled. They must also report them to the Station, and see that the analysis fees are duly paid, in order that the Director may be able to discharge his duty as prescribed in Section 4013 of the Act.

It will be noticed that the State exacts no license tax either for making or dealing in fertilizers. For the safety of consumers and the benefit of honest manufacturers and dealers, the State requires that it be known what is offered for sale, and whether fertilizers are what they purport to be. With this object in view the law provides, in Section 4013, that all fertilizers be analyzed, and it requires the parties making or selling them to pay for these analyses in part; the State itself paying in part by maintaining the Experiment Station.

ACTS CONCERNING COMMERCIAL FERTILIZERS.

Chapter CCLIII of the General Statutes of Connecticut as amended by Chapter CLXXII of the Acts of the General Assembly, Session of 1893.

SECTION 4005. Every person or company who shall sell, offer, or expose for sale, in this State, any commercial fertilizer or manure except stable manure, and the products of local manufacturers of less value than ten dollars a ton, shall affix conspicuously to every package thereof a plainly printed statement clearly and truly certifying the number of net pounds of fertilizer in the package, the name, brand, or trademark under which the fertilizer is sold, the name and address of the manufacturer, the place of manufacture, and the chemical composition of the fertilizer, expressed in the terms and manner approved and usually employed by the Connecticut Agricultural Experiment Station.

If any such fertilizer be sold in bulk, such printed statement shall accompany every lot and parcel sold, offered, or exposed for sale.

SEC. 4006. Before any commercial fertilizer is sold, offered, or exposed for sale, the manufacturer, importer, or person who causes it to be sold, or offered for sale, within this State, shall file with the Director of the Connecticut Agricultural Experiment Station two certified copies of the statement prescribed in Section 4005, and shall deposit with said director a sealed glass jar or bottle containing not less than one pound of the fertilizer, accompanied by an affidavit that it is a fair average sample thereof.

SEC. 4007. The manufacturer, importer, agent, or seller of any commercial fertilizer shall pay on or before May 1, annually, to the Director of the Connecticut Agricultural Experiment Station, an analysis fee of ten dollars for each of the fertilizing ingredients contained or claimed to exist in said fertilizer: *provided*, that when the manufacturer or importer shall have paid the fee herein required for any person acting as agent or seller for such manufacturer or importer, such agent or seller shall not be required to pay the fee prescribed in this section.

SEC. 4008. Every person in this State who sells, or acts as local agent for the sale of any commercial fertilizer of whatever kind or price, shall annually, or at the time of becoming such seller or agent, report to the Director of the Connecticut Agri-

cultural Experiment Station his name and brand of said fertilizer, with the name and address of the manufacturer, importer, or party from whom such fertilizer was obtained, and shall, on demand of the Director of the Connecticut Agricultural Experiment Station, deliver to said director a sample suitable for analysis of any such fertilizer or manure then and there sold or offered for sale by said seller or agent.

SEC. 4009. No person or party shall sell, offer, or expose for sale, in this State, any pulverized leather, raw, steamed, roasted, or in any form, as a fertilizer or as an ingredient of any fertilizer or manure, without explicit printed certificate of the fact, such certificate to be conspicuously affixed to every package of such fertilizer or manure, and to accompany every parcel or lot of the same.

SEC. 4010. Every manufacturer of fish guano, or fertilizers of which the principal ingredient is fish or fish mass from which the oil has been extracted, shall, before manufacturing or heating the same, and within thirty-six hours from the time such fish or mass has been delivered to him, treat the same with sulphuric acid or other chemicals, approved by the director of said experiment station, in such quantity as to arrest decomposition: *provided, however,* that in lieu of such treatment such manufacturers may provide a means for consuming all smoke and vapors arising from such fertilizers during the process of manufacture.

SEC. 4011. Any person violating any provisions of the foregoing sections of this chapter shall be fined one hundred dollars for the first offense, and two hundred dollars for each subsequent violation.

SEC. 4012. This chapter shall not affect parties manufacturing, importing, or purchasing fertilizers for their own private use, and not to sell in this State.

SEC. 4013. The Director of the Connecticut Agricultural Experiment Station shall pay the analysis fees received by him into the treasury of the Station, and shall cause one or more analyses of each fertilizer to be made and published annually. Said director is hereby authorized, in person or by deputy, to take samples for analysis from any lot or package of manure or fertilizer which may be in the possession of any dealer.

SEC. 4014. The Director of the Connecticut Agricultural Experiment Station shall, from time to time, as bulletins of said Station may be issued, mail or cause to be mailed two copies, at least, of such bulletins to each post-office in the State.

OBSERVANCE OF THE FERTILIZER LAW.

Here follows an alphabetical list of the manufacturers who have paid analysis fees as required by the Fertilizer Law, and the names or brands of the fertilizers for which fees have been paid by them for the year ending May, 1899:

Firm.	*Brand of Fertilizer.*
Armour Fertilizer Works, Chicago, Ill.	Ammoniated Bone with Potash, Grain Grower, Bone, Blood, and Potash. All Soluble.
Baker, H. J. & Bro., 93 William St., N. Y. city.	Complete Tobacco Manure, "AA" Ammoniated Superphosphate, "Harvest Home" Fertilizer, Complete Potato Manure, Complete Manure for General Use, Standard UnXLD. Fertilizer, Vegetable, Vine, and Potato Manure, Castor Pomace.
Berkshire Mills Co., Bridgeport, Conn.	Berkshire Complete Fertilizer, Ammoniated Bone Phosphate, Ground Bone.
Boardman, F. E., Little River, Conn.	Boardman's Complete Manure for Potatoes and Vegetables.
Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	Stockbridge Special Tobacco Manure, " " Corn Manure, " " Grass Top Dressing and Forage Crop Manure, " " Potato and Vegetable Manure, Bowker's Special Fertilizer — Potato and Vegetables, " Potato Phosphate, " Hill and Drill Phosphate, " Farm and Garden, or Ammoniated Bone Fertilizer, " Fish and Potash, Square Brand, " Tobacco Starter, " Sure Crop Phosphate, " Market Garden Fertilizer, " Square Brand Bone and Potash, " Corn Phosphate, " Bone and Wood Ash Fertilizer, " Tobacco Ash Elements, " " " Fertilizer, " Middlesex Special, " Fisherman Brand Fish and Potash, " Dry Ground Fish,

Firm.	*Brand of Fertilizer.*
Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	Nitrate of Soda, Dissolved Bone Black, Muriate of Potash, Fresh Ground Bone, Tankage.
Bradley Fertilizer Co., 92 State St., Boston, Mass.	Bradley's Eclipse Phosphate, " High Grade Tobacco Manure, " Farmers' New Method Fertilizer, " Original Coe's Superphosphate, " B. D. Sea Fowl Guano, " Triangle A Fish and Potash, " Anchor Brand Fish and Potash, " Circle Brand Ground Bone with Potash, " Fine Ground Bone, " Complete Manure for Corn and Grain, " Complete Manure for Top-dressing Grass and Grain, " Complete Manure for Potatoes and Vegetables, " Potato Manure, " Superphosphate, " Corn Phosphate, " Potato Fertilizer, " Niagara Phosphate, " Tobacco Fertilizer.
Wm. E. Brightman, Tiverton, R. I.	Brightman's Fish and Potash, " Tobacco Special and Market Garden Fertilizer, " Ammoniated Bone and Potash, " Bone Meal, " Dry Ground Fish.
Buckingham, C., Southport, Conn.	XX Formula.
Burwell, E. E., New Haven, Conn.	Double Sulphate of Potash, Muriate of Potash, Blood and Meat, Dissolved Bone Black, Nitrate of Soda.
Clark's Cove Fertilizer Co., P. O. Box 1779, New York city.	Great Planet A. Manure, Bay State Fertilizer, G. G., Potato Fertilizer, King Philip Guano, Defiance Complete Manure, White Oak Pure Ground Bone.
Cleveland Dryer Co., 92 State St., Boston, Mass.	Cleveland Superphosphate, " High Grade Complete Manure, " Potato Phosphate,

Firm.	*Brand of Fertilizer.*
Cleveland Dryer Co., 92 State St., Boston, Mass.	Cleveland Fertilizer, " Pioneer Fertilizer, " Extra Fine Ground Bone.
Coe, E. Frank Co., 133–137 Front St., New York city.	E. Frank Coe's High Grade Ammoniated Bone Superphosphate, " High Grade Potato Fertilizer, " Gold Brand Excelsior Guano, " Ground Bone and Potash, " Special Tobacco Fertilizer.
Connecticut Reduction Co., Bridgeport, Conn.	Conn. Reduction Co.'s Fertilizer.
Connecticut Valley Orchard Co., Berlin, Conn.	C. V. O. Co's Phosphate.
Cooper's Glue Factory, Peter, 17 Burling slip, N. Y. city.	Bone Dust.
Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	Crocker's Potato, Hop, and Tobacco Fertilizer, " Ammoniated Bone Superphosphate, " Wheat and Corn Phosphate, " New Rival Ammoniated Superphosphate, " Pure Ground Bone, " Special Potato Manure, " General Crop Phosphate, " Ground Bone Meal, " Vegetable Bone Superphosphate, " New England Tobacco and Potato Grower, " A. A. Complete Manure, " Universal Grain Grower,
Cumberland Bone-Phosphate Co., State St. and Merchants Row, Boston, Mass.	Cumberland Superphosphate, " Concentrated Phosphate, " Potato Fertilizer, " Fertilizer, " Hawkeye Fertilizer, " Extra Fine Ground Bone.
Darling Fertilizer Co., L. B., Pawtucket, R. I.	Potato and Root Brand, Animal Fertilizer, Tobacco Grower, Blood, Bone, and Potash, Dissolved Bone and Potash, G. Brand, Pure Fine Bone.
Dennis, E. C., Stafford Springs, Conn.	Ground Bone.

Firm.	*Brand of Fertilizer.*
Downs & Griffin, Derby, Conn.	Ground Bone.
F. Ellsworth, Hartford, Conn.	Shoemaker's Swift Sure Bone Meal, " " " Superphosphate.
Great Eastern Fertilizer Co., Rutland, Vermont.	Northern Corn Special, Vegetable, Vine, and Tobacco, Grass and Oats, General, Garden Special.
Hartford Fertilizer Co., Hartford, Conn.	Ground Bone.
Kelsey, E. R., Branford, Conn.	Bone, Fish, and Potash.
Lederer & Wolf, New Haven, Conn.	Pure Ground Bone.
Lister's Agricultural Chemical Works, Newark, N. J.	Success Fertilizer, Standard Pure Bone Superphosphate of Lime, Special Potato, Potato Manure, Bone and Potash.
Lowell Fertilizer Co., 44 No. Market St., Boston, Mass.	Lowell Bone Fertilizer, " Animal Fertilizer, " Potato Phosphate, " Tobacco Manure, " Ground Bone, Dissolved Bone and Potash, Market Garden, Fruit and Vine.
Luce Bros., Niantic, Conn.	Dry Ground Fish Guano, Bone, Fish, and Potash.
Ludlam, Frederick, 108 Water St., N. Y. city.	Cecrops, or Dragon's Tooth Brand, Cereal Brand.
Manchester, E. & Sons, West Winsted, Conn.	Manchester's Formula.
Mapes, F. & P. G. Co., The, 143 Liberty St., N. Y. city.	Potato Manure, Tobacco Manure (Wrapper Brand), Economical Potato Manure, Corn Manure, Complete Manure "A" Brand, Cereal Brand, Tobacco Starter, Fruit and Vine Manure, Vegetable Manure, or Complete Manure for Light Soils, Grass and Grain Spring Top Dressing, Dissolved Bone, Tobacco Ash Constituents, Seeding Down Manure.
McCormack, William, Wolcott, Conn.	Ground Bone.

Firm.	*Brand of Fertilizer.*
Miller, George W., Middlefield, Conn.	Geo. W. Miller's Unexcelled Phosphate, " Pure Ground Bone.
Milsom Rendering & Fertilizer Co., 963 William St., East Buffalo, N. Y.	Potato, Hop, and Tobacco Phosphate, Buffalo Guano, Cyclone Bone, Wheat, Oats, and Barley Phosphate, Potato Special, Corn Fertilizer, Buffalo Fertilizer, Bone Meal, Dissolved Bone and Potash, Erie King, Dissolved Bone, Vegetable Bone Fertilizer.
National Fertilizer Co., Bridgeport, Conn.	Chittenden's Complete Fertilizers, " Ammoniated Bone, " Fish and Potash, " Market Garden, " Potato Phosphate, " Fine Ground Bone.
Niagara Fertilizer Works, The, Buffalo, N. Y.	Niagara Triumph, " Wheat and Corn Producer, " Grain and Grass Grower, " Potato, Tobacco, and Hop Fertilizer.
Nuhn, Successor to Frederick, Waterbury, Conn.	Ground Bone.
Olds & Whipple, Hartford, Conn.	O. & W. Special Phosphate.
Pacific Guano Co., P. O. Box 1368, Boston, Mass.	Soluble Pacific Guano, Potato Special, Nobsque Guano, High Grade General Fertilizer, Grass and Grain Fertilizer, Fine Ground Bone.
Packers' Union Fertilizer Co., P. O. Box 1528, New York city.	Wheat, Oats, and Clover Fertilizer, Universal Fertilizer, Animal Corn Fertilizer, Potato Manure, Gardeners' Complete Manure.
Peck Bros., Northfield, Conn.	Pure Ground Bone.
Plumb & Winton Co., Bridgeport, Conn.	Ground Bone.
Preston Fertilizer Co., Greenpoint, L.I.	Potato and Onion, Potato, Potato and Corn Guano.
Quinnipiac Co., The, 92 State St., Boston, Mass.	Phosphate, Potato Manure, Potato Phosphate,

Firm.	*Brand of Fertilizer.*
Quinnipiac Co., The, 92 State St., Boston, Mass.	Market Garden Manure, Grass Fertilizer, Corn Manure, Pure Bone Meal, Fish and Potash Crossed Fishes, Climax Phosphate, Pequot Fish and Potash, Onion Manure, Muriate Potash, Sulphate Potash, Sulphate Ammonia, Nitrate Soda, Dissolved Bone Black, Dry Ground Fish.
Read Fertilizer Co., Box 3121 New York city.	Read's Standard, Bone, Fish, and Potash, Vegetable and Vine, High Grade Farmer's Friend, Leader Guano, Practical Potato Special.
Rogers & Hubbard Co., Middletown, Conn.	Hubbard's Pure Raw Knuckle Bone Flour, " Strictly Pure Fine Bone, " Fertilizer for Oats and Top-dressing, " Fertilizer for All Soils and All Crops, " Potato Phosphate, " Soluble Potato Manure, " Fairchild's Formula, Corn and General Crops, " Soluble Tobacco Manure, " Grass and Grain Fertilizer.
Rogers Mfg. Co., Rockfall, Conn.	Pure Ground Bone, High Grade Soluble Potato, Complete Potato, Complete Corn, Oats and Top Dressing, High Grade Tobacco Manure, Grass and Grain Manure, Fish and Potash.
Russia Cement Co., Gloucester, Mass.	Essex XXX Fish and Potash, " Complete Manure for Potatoes, Roots, and Vegetables, " Complete Manure for Corn, Grain, and Grass, " Potato Fertilizer, " Tobacco Fertilizer.
L. Sanderson, New Haven, Conn.	Sanderson's Formula A, " Old Reliable Superphosphate, " Potato Manure, " Special with 10% Potash Nitrate of Soda,

Firm.	*Brand of Fertilizer.*
L, Sanderson, New Haven, Conn.	Dissolved Bone Black, Blood, Bone, and Meat, Sulphate of Potash (Double), Muriate of Potash, Bone.
Standard Fertilizer Co., Farlow Building, State St., Boston, Mass.	Standard Fertilizer, " Special for Potatoes, " Guano, " Complete Manure.
Tucker, Henry F. Co., Farlow Building, State St., Boston, Mass.	Tucker's Special Potato Fertilizer, " Original Bay State Bone Superphosphate, " Bay State Special Fertilizer, " Imperial Bone Superphosphate.
Wheeler, M. E. & Co., Rutland, Vt.	M. E. Wheeler & Co.'s High Grade Corn Fertilizer, " " High Grade Potato Manure, " " Superior Truck Fertilizer, " " Havana Tobacco Grower, " " High Grade Fruit Fertilizer, " " High Grade Grass and Oats, " " High Grade Electrical Dissolved Bone, " " High Grade Pure Ground Bone.
Wilcox Fertilizer Works, Mystic, Conn.	Potato, Onion, and Tobacco Manure, Complete Bone Superphosphate, Potato Manure, High Grade Fish and Potash, Dry Ground Fish Guano.
Williams & Clark Fertilizer Co., 27 William St., N. Y. city.	Americus Ammoniated Bone Superphosphate, Americus Potato Phosphate, Corn Phosphate, Americus High Grade Special, Royal Bone Phosphate, Fine Wrapper Tobacco, Americus Pure Bone Meal, Potato Manure, Muriate of Potash, Kainit, Dissolved Bone Black, Dry Ground Fish.

SAMPLING AND COLLECTION OF FERTILIZERS.

During April, May, and June, Mr. V. L. Churchill, the sampling agent of this Station, visited one hundred and twenty-nine towns and villages of Connecticut, to draw samples of commercial fertilizers for analysis. These places were distributed as follows:—

Litchfield County,	12
Hartford County,	34
Tolland County,	12
Windham County,	12
New London County,	12
Middlesex County,	15
New Haven County,	18
Fairfield County,	14
	129

In these places 776 samples were taken, representing all but five of the brands which have been entered for sale in this State.

The brands entered for sale in this State, which the sampling agent was unable to find on sale and of which no samples were received from the manufacturers, were the following:—

H. J. Baker & Bro.'s Complete Manure, for general use.
Cleveland Dryer Co.'s Extra Fine Bone.
The E. Frank Coe Co.'s Special Tobacco Manure.
Cumberland Fertilizer Co.'s Fertilizer.
The Williams & Clark Fertilizer Co.'s Dissolved Bone Black.

It has not been possible, therefore, for the Station to make analyses of these five fertilizers.

When several samples of a single brand were drawn in different parts of the State, the analysis was performed, not on any single sample, but on a mixture made of an equal weight of each of the several samples. Thus, it is believed, the average composition of the goods is more fairly represented than by the analysis of any single sample.

The Station agent is instructed in every case to open at least three packages of each brand for sampling, and, if the number of packages is very large, to take a portion from every tenth one, by means of a sampling tube which withdraws a section or core through the entire length of the bag or barrel.

As a rule, the Station will not analyze samples taken—

1. From dealer's stock of less than one ton.
2. From stock which has lain over from last season.
3. From stock which evidently is improperly stored, as in bags lying on wet ground or exposed to the weather, etc.

The Station desires the coöperation of farmers, farmers' clubs and granges in calling attention to new brands of fertilizers, and in securing samples of all goods offered for sale. *All samples must be drawn in strict accordance with Station's Instructions for Sampling, and must also be properly certified,* if the Station analysis is desired. A copy of these instructions and blank certificates will be sent on application.

ANALYSES OF FERTILIZERS.

During the year, 569 samples of commercial fertilizers and manurial waste-products have been analyzed. A classified list of them is given on page 21.

On a few of these samples, analyses were made for private parties and charged for accordingly. A few others were analyzed at the request of other experiment stations in order to compare and test analytical methods. Results of the examination of all the samples, with these exceptions, are given in detail in the following pages. When the contrary is not stated, the samples were drawn by an agent of the Station.

Samples are analyzed as promptly as possible in the order in which they are received. As soon as an analysis is completed a copy of it is sent to the party who furnished the sample, and also to the manufacturer, in order that there may be opportunity for correction or protest, before the results are published.

The following "Explanations" are intended to embody the principles and data upon which the valuation of fertilizers is based, a knowledge of which is essential to a correct understanding of the analyses that are given on subsequent pages.

EXPLANATIONS CONCERNING THE ANALYSIS OF FERTILIZERS AND THE VALUATION OF THEIR ACTIVE INGREDIENTS.*

The Elements of Fertilizers.

The three chemical elements whose compounds chiefly give value, both commercial and agricultural, to fertilizers, are Nitrogen, Phosphorus, and Potassium. The other elements found in fertilizers, viz.: Sodium, Calcium, Magnesium, Iron, Silicon, Sulphur, Chlorine, Carbon, Hydrogen, and Oxygen, which are necessary or advantageous to the growth of vegetation, are either so abundant in the soil or may be so cheaply supplied to crops, that they do not considerably affect either the value or cost of high-priced commercial fertilizers.

Nitrogen in fertilizers is, on the whole, the least abundant of their valuable elements, and is, therefore, their most costly ingredient.

Free Nitrogen is universally abundant, making up nearly four-fifths of the common air, and appears to be directly assimilable by various low vegetable organisms, and with aid of certain bacteria, by leguminous plants (the clovers, alfalfa, peas, beans, lentils, esparsette, lupins, vetches, lathyrus, peanut, yellow locust, honey locust, etc.), and by a few non-leguminous plants, carrying root nodules, viz.: the Oleasters (*Eleagnus*), the *Alders* (*Alnus*), and a single family of coniferous trees (*Podocarpus*), but not at all, according to present evidence, by the cereals or other field and garden crops.

Organic Nitrogen is the nitrogen of animal and vegetable matters which is chemically united to carbon, hydrogen, and oxygen. Some forms of organic nitrogen, as those of blood, flesh, and seeds, are highly active as fertilizers; others, as found in leather and peat, are comparatively slow in their effect on vegetation, unless these matters are chemically disintegrated. Since organic nitrogen may often readily take the form of ammonia, it has been termed *potential ammonia.*

Ammonia (NH_3) *and Nitric Acid* (N_2O_5) are results of the chemical change of *organic nitrogen* in the soil and manure heap, and contain nitrogen in its most active forms. They occur in commerce—the former in sulphate of ammonia, the latter in nitrate of soda: 17 parts of ammonia, or 66 parts of pure sulphate of ammonia, contain 14 parts of nitrogen: 85 parts of pure nitrate of soda also contain 14 parts of nitrogen.

Phosphorus is, next to nitrogen, the most costly ingredient of fertilizers, wherein it exists in the form of phosphates, usually those of calcium, iron, and aluminum, or in case of "superphosphates," to some extent in the form of free phosphoric acid.

Water-soluble Phosphoric Acid is phosphoric acid (or a phosphate) that freely dissolves in water. It is the characteristic ingredient of

* Prepared and revised by the Director.

superphosphates, in which it is produced by acting on "insoluble" (or "citrate soluble") phosphates, with diluted sulphuric acid. Once well incorporated with the soil, it gradually "reverts" and becomes insoluble, or very slightly soluble, in water.

Citrate-soluble Phosphoric Acid signifies the phosphoric acid (of various phosphates) that is freely taken up by a hot strong solution of neutral ammonium citrate, which solution is, therefore, used in analysis to determine its quantity. The designation *citrate-soluble* is synonymous with the less explicit terms *reverted, reduced,* and *precipitated,* which all imply phosphoric acid that was once easily soluble in water, but from chemical change has become insoluble in that liquid.

Recent investigation tends to show that water-soluble and citrate-soluble phosphoric acid are on the whole about equally valuable as plant food, and of nearly equal commercial value. In some cases, indeed, the water-soluble gives better results on crops; in others, the "reverted" is superior. In most instances there is probably little to choose between them.

Insoluble Phosphoric Acid implies various phosphates insoluble both in water and in hot solution of neutral ammonium citrate. The phosphoric acid of Canadian "Apatite," of South Carolina and Florida "Rock Phosphate," and of similar dense mineral phosphates, as well as that of "bone ash" and "bone black," is mostly insoluble in this sense, and in the majority of cases gives no visible good results when these substances, in the usual ground state, are applied to crops. They contain, however, a small proportion of citrate-soluble phosphoric acid, and sometimes, when they are reduced to extremely fine dust (floats) or applied in large quantities, especially on "sour soils" or in conjunction with abundance of decaying vegetable matter (humus), they operate as efficient fertilizers.

Available Phosphoric Acid is an expression properly employed in general to signify phosphoric acid in any form, or phosphates of any kind that serve to nourish vegetation. In the soil, phosphoric acid and all phosphates, whatever their solubilities as defined in the foregoing paragraphs, are more or less freely and extensively available to growing plants. Great abundance of "insoluble" phosphoric acid may serve crops equally well with great solubility of a small supply, especially when the soil and the crop carry with them conditions highly favorable to the assimilation of plant food.

In Commercial Fertilizers, "available phosphoric acid" is frequently understood to be the sum total of the "water-soluble" and the "citrate-soluble," with the exclusion of the "insoluble."

The "insoluble phosphoric acid" in a commercial fertilizer costing $20 to $50 per ton, has very little or no value to the purchaser, because the quantity of it which can commonly go upon an acre of land has no perceptible effect upon the crop, and because its presence in the fertilizer excludes an equal percentage of more needful and much more valuable ingredients.

In Raw Bone the phosphoric acid (calcium phosphate) is nearly

insoluble, because of the animal matter of the bones which envelopes it; but when the animal matter decays in the soil, or when it is disintegrated by boiling or steaming, the phosphate mostly remains in an available form. The phosphoric acid of "Basic-Slag" and of "Grand Cayman's Phosphate" is in some soils as freely taken up by crops as water-soluble phosphoric acid, but in other soils is much less available than the latter.

Phosphoric acid in all the Station analyses is reckoned as "anhydrous phosphoric acid" (P_2O_5), also termed among chemists phosphoric anhydride, phosphoric oxide, and phosphorus pentoxide.

Potassium is the constituent of fertilizers which ranks third in costliness. In plants, soils, and fertilizers, it exists in the form of various salts, such as chloride (muriate), sulphate, carbonate, nitrate, silicate, etc. Potassium itself is scarcely known except as a chemical curiosity.

Potash signifies the substance known in chemistry as potassium oxide (K_2O), which is reckoned as the valuable fertilizing ingredient of "potashes" and "potash salts." In these it should be freely soluble in water and is most costly in the form of sulphate, and cheapest in the form of muriate (potassium chloride). In unleached ashes of wood and of cotton-seed hulls it exists mainly as potassium carbonate.

Valuation of Fertilizers.

The valuation of a fertilizer, as practised at this Station, consists in calculating the *retail Trade-value* or *cash-cost* (in raw material of good quality) of an amount of nitrogen, phosphoric acid, and potash equal to that contained in one ton of the fertilizer.

Plaster, lime, stable manure, and nearly all of the less expensive fertilizers have variable prices, which bear no close relation to their chemical composition, but guanos, superphosphates, and similar articles, for which $30 to $50 per ton are paid, depend for their trade-value exclusively on the substances, *nitrogen, phosphoric acid, and potash*, which are comparatively costly and steady in price. The trade-value per pound of these ingredients is reckoned from the current market prices of the standard articles which furnish them to commerce.

The consumer, in estimating the reasonable price to pay for high-grade fertilizers, should add to the *Trade-value of the above-named ingredients* a suitable margin for the expenses of manufacture, etc., and for the convenience or other advantage incidental to their use.

Trade-Value of Fertilizer Elements for 1898.*

The average trade-values or retail costs in market, per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid, and potash in raw materials and chemicals, as found in New England, New York, and New Jersey markets during 1897 were as follows:

* Adopted at a conference of representatives of the Connecticut, Massachusetts, New Jersey, and Rhode Island Stations held in March, 1898.

	Cents per pound.
Nitrogen in ammonia salts,	14
in nitrates,	14
Organic nitrogen, in dry and fine-ground fish, meat, and blood, and in mixed fertilizers,	14
in cotton-seed meal,	12
in fine* bone and tankage,	13½
in coarse* bone and tankage,	10
Phosphoric acid, water-soluble,	4½
citrate-soluble,†	4
of fine* ground fish, bone, and tankage,	4
of coarse* fish, bone, and tankage,	3½
of cotton-seed meal, castor pomace, and ashes,	4
of mixed fertilizers, if insoluble in ammonium citrate,†	2
Potash as high-grade sulphate and in forms free from muriate (or chlorides),	5
as muriate,	4¼

The foregoing are, as nearly as can be estimated, the prices at which, during the six months preceding March last, the respective ingredients were retailed for cash, in our large markets, in those *raw materials* which are the regular source of supply. They also correspond to the average wholesale price for the six months ending March 1st, plus about 20 per cent. in case of goods for which we have wholesale quotations. The valuations obtained by use of the above figures will be found to correspond fairly with the *average retail prices at the large markets, of standard raw materials, such as the following:*

* In this report "fine," as applied to bone and tankage, signifies smaller than $\frac{1}{50}$ inch; and "coarse," larger than $\frac{1}{50}$ inch. From 1878 on for 10 years, we distinguished five grades of bone, as to fineness. In 1888, one, in 1897 two of the coarser grades were dropped from the list. The smaller grades remain unchanged in dimensions, but "coarse" was for the first 10 years larger than $\frac{1}{6}$ inch, for the next 9 years included all larger than inch, for the next year all larger than $\frac{1}{25}$ inch, and in this year all larger than $\frac{1}{50}$ inch; the former "coarse-medium," "medium," and "fine-medium" having been successively merged in "coarse."

† Dissolved from 2 grams of the fertilizer, previously extracted with pure water, by 100 cc. neutral solution of ammonium citrate, sp. gr. 1.09, in 30 minutes, at 65° C., with agitation once in five minutes. Commonly called "reverted" or "backgone" Phosphoric Acid.

Sulphate of Ammonia,	Muriate of Potash,
Nitrate of Soda,	Sulphate of Potash,
Dried Blood,	Plain Superphosphates,
Azotin,	Dry Ground Fish,
Ammonite,	Bones and Tankage,

Ground South Carolina Rock.

Valuation of Superphosphates, Special Manures and Mixed Fertilizers of High Grade.

The Organic Nitrogen in these classes of goods is reckoned at the price of nitrogen in raw materials of the best quality,* 14 cents.

Insoluble Phosphoric Acid is reckoned at 2 cents per pound. Potash is rated at 4¼ cents, if sufficient chlorine is present in the fertilizer to combine with it to make muriate. If there is more Potash present than will combine with the chlorine, then this excess of Potash is reckoned at 5 cents per pound.

In most cases the valuation of the ingredients in superphosphates and specials falls below the retail price of these goods. The difference between the two figures represents the manufacturer's charges for converting raw materials into manufactured articles and selling them. The charges are for grinding and mixing, bagging or barreling, storage, and transportation, commission to agents and dealers, long credits, interest on investments, bad debts, and, finally, profits.

The majority of the manufacturers agree that the average cost of mixing, bagging, handling, and cartage ranges from $3 to $4.50 per ton.

In 1898 the average selling price of Ammoniated Superphosphates and Guanos was $29.22 per ton, the average valuation was $19.30, and the difference $9.92, an advance of 51.4 per cent. on the valuation and on the wholesale cost of the fertilizing elements in the raw materials.

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* This concession gives the dishonest manufacturer the opportunity to defraud the consumer very easily and very seriously, by "working off" inferior or almost worthless leather, bat guano, and similar materials which "analyze well," containing up to 8 or 9 per cent. of nitrogen, much or all of which may be quite inert. Since the Station has had no practicable means of determining with certainty the amount of worthless nitrogen or the quality of the nitrogen in a mixed fertilizer, and since the honest manufacturers (doubtless, the greater number) use only "materials of the best quality," it would be unjust to them to assume that these fertilizers contain anything inferior. Farmers should satisfy themselves that they are dealing only with honest and with intelligent manufacturers. This can be done at little cost by such co-operation as Farmers' Clubs and Granges may practice, sending a competent and trusty agent to visit factories frequently and unexpectedly, and take samples of raw materials. Honorable manufacturers will be glad to show all their raw materials and processes to their customers, especially if such inspection is insisted on as a preliminary to business. Co-operation may thus insure satisfactory quality of goods, as well as reduced cost.

In case of special manures the average cost was $33.11, the average valuation $21.72, and the difference $11.39 or 52.4 per cent. advance on the valuation.

To obtain the Valuation of a Fertilizer we multiply the pounds per ton of nitrogen, etc., by the trade-value per pound. We thus get the values per ton of the several ingredients, and adding them together we obtain the total valuation per ton.

In case of *Ground Bone and Tankage,* the sample is sifted into the two grades just specified (see footnote, page 17), and we separately compute the nitrogen-value of each grade by multiplying the pounds of nitrogen per ton by the per cent. of each grade, taking $\frac{1}{10}$th of that product, multiplying it by the trade-value per pound of nitrogen in that grade, and taking this final product as the result in cents. Summing up the separate values of each grade thus obtained, together with the values of each grade of phosphoric acid, similarly computed, the total is the Valuation of the sample of bone.

Uses and Limitations of Fertilizer Valuation.

The uses of the "Valuation" are two-fold:

1. To show whether a given lot or brand of fertilizer is worth, as a commodity of trade, what it costs. If the selling price is not higher than the valuation, the purchaser may be tolerably sure that the price is reasonable. If the selling price is twenty to twenty-five per cent. higher than the valuation, it may still be a fair price; but in proportion as the cost per ton exceeds the valuation there is reason to doubt the economy of its purchase.

2. Comparisons of the valuation and selling prices of a number of similar fertilizers will generally indicate fairly which is the best for the money.

But the valuation is not to be too literally construed, for in some cases analysis cannot discriminate positively between the active and the inert forms of nitrogen, while the mechanical condition of a fertilizer is an item whose influence cannot always be rightly expressed or appreciated.

For the above first-named purpose of valuation, the trade-values of the fertilizing elements which are employed in the computations should be as exact as possible, and should be frequently corrected to follow the changes of the market.

For the second-named use of valuation frequent changes of the trade-value are disadvantageous, because two fertilizers cannot be compared as to their relative money-worth when their valuations are deduced from different data.

Experience leads to the conclusion that the trade-values adopted at the beginning of the year should be adhered to as nearly as possible throughout the year, notice being taken of considerable changes in the market, in order that due allowance may be made therefor.

Agricultural Value of Fertilizers.

The Agricultural Value of a fertilizer is measured by the benefits received from its use, and depends upon its fertilizing effect, or crop-producing power. As a broad, general rule, it is true that ground bone, superphosphates, fish scraps, dried blood, potash salts, etc., have a high agricultural value which is related to their trade-value, and to a degree determines the latter value. But the rule has many exceptions, and in particular instances the trade-value cannot always be expected to fix or even to indicate the agricultural value. Fertilizing effect depends largely upon soil, crop, and weather, and as these vary from place to place, and from year to year, it cannot be foretold or estimated except by the results of past experience, and then only in a general and probable manner.

CLASSIFICATION OF FERTILIZERS ANALYZED.

RAW MATERIALS.

1. *Containing Nitrogen as the Chief Valuable Ingredient.*

	No. of Samples
Nitrate of Soda,	14
Sulphate of Ammonia,	2
Dried Blood,	2
Cotton-Seed Meal,	34
Castor Pomace,	5
Rape-Seed Meal,	1

2. *Containing Phosphoric Acid as the Chief Valuable Ingredient.*

Rock Phosphate,	3
Dissolved Bone Black,	8
Acid Phosphate,	10

3. *Containing Potash as the Chief Valuable Ingredient.*

High Grade Sulphate of Potash,	5
Double Sulphate of Potash and Magnesia,	9
Muriate of Potash,	19
Kainit,	4
Carbonate of Potash,	1
Silicate of Potash,	1
Phosphate of Potash,	1
Tobacco Stems,	4

4. *Containing Nitrogen and Phosphoric Acid.*

Bone Manures,	72
Tankage,	14
Fish,	6

MIXED FERTILIZERS.

Bone and Potash,	3
Nitrogenous Superphosphates and Guanos,	133
Special Manures,	114
Home Mixtures,	24

MISCELLANEOUS FERTILIZERS AND MANURES.

Cotton Hull Ashes,	48
Corn Cob Ashes,	1
Wood Ashes,	20
Lime Kiln Ashes,	2
Lime,	1
Marl,	1
Plaster,	1
Bat Guano,	1
Street Sweepings,	1
Ground Weed Seed,	1
Jadoo Fiber,	1
Rotted Peat,	2
Total,	569

DESCRIPTION AND ANALYSES OF FERTILIZERS.*

The samples referred to in the following pages, unless the contrary is stated, were drawn by an agent of the Station.

I. RAW MATERIALS CHIEFLY VALUABLE FOR NITROGEN.

NITRATE OF SODA OR SODIUM NITRATE.

Nitrate of Soda is mined in Chili and purified there before shipment. It contains about 16 per cent. of nitrogen, equivalent to 97 per cent. of pure sodium nitrate. The usual guarantee is "96 per cent." of sodium nitrate, equivalent to 15.8 per cent. of nitrogen.

In rare cases cargoes have been found to contain sodium perchlorate which, even in small amount, is very injurious to vegetation.

Fourteen analyses of nitrate of soda are given in a following table. The percentage of nitrogen ranges from 15.32, equivalent to 93 per cent. of nitrate,—to 16.04. All the samples are therefore of fair to good quality.

The prices ranged from $40 to $45 per ton.

The cost of nitrogen in nitrate of soda has ranged from 12.7 to 14.7 cents per pound, the average cost being 13.5 cents, a cent less than in the previous year.

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* This chapter has been prepared for publication by Dr. Jenkins. The analyses of fertilizers have all been made by Messrs. Winton, Ogden, and Mitchell, chemists of the Station, with the assistance of Mr. Lange.

Analyses of Nitrate of Soda.

Station No.	Sold by	Sampled from Stock of	Nitrogen.	Equivalent Nitrate.	Cost per ton.	Nitrogen costs cents per pound.
10377	M. L. Shoemaker & Co., Philadelphia,	Daniels Bros., Middletown,	15.72	95.42	$40.00	12.7
10304	Bowker Fertilizer Co., Boston,	W. H. Todd, North Haven,	16.04	97.36	41.00	12.7
10310	Bowker Fertilizer Co., Boston,	Fred. R. Jennings, Greenfield Hill,	15.58	94.57	40.00	12.8
10556	Bradley Fertilizer Co., Boston,	G. B. Porter, Waterbury,	15.40	93.48	40.00	13.0
10513	L. Sanderson, New Haven,	E. Manchester & Sons, West Winsted,	15.32	92.99	40.00	13.1
10256	E. E. Burwell, "	E. E. Burwell, New Haven,	15.94	96.76	42.00	13.2
10506	F. S. Bidwell, Windsor Locks,	George Rengerman, East Granby,	15.46	93.84	41.00	13.3
10444	Bowker Fertilizer Co., Boston,	Clifton Peck, Yantic,	15.60	94.69	43.00	13.8
10372	L. Sanderson, New Haven,	Dennis Fenn, Milford,	15.88	96.39	45.00	14.1
10381	Quinnipiac Company, Boston,	Olds & Whipple, Hartford,	15.80	95.91	45.00	14.2
10263	L. Sanderson, New Haven,	L. Sanderson, New Haven,	15.70	95.30	45.00	14.3
10428	L. Sanderson, "	Chas. B. Sheldon, W. Suffield,	15.14	91.90	45.00	14.7
10249	.....	S. D. Woodruff & Sons, Orange,	15.76	95.66	.....	.....
10162	L. Sanderson, New Haven,	Agricultural Station,	15.89	.....	.....	.....

SULPHATE OF AMMONIA, OR AMMONIUM SULPHATE.

This article, now made on a large scale as a by-product of gas works and coke ovens, usually contains over 20 per cent. of nitrogen, the equivalent of 94-97 per cent. of ammonium sulphate. The rest is chiefly moisture. The usual guarantee is 25 per cent. of ammonia, which is equivalent to 20.6 per cent. of nitrogen.

10380. Sold by Quinnipiac Co., Boston, Mass. Sampled from stock of Olds & Whipple, Hartford.

10658. Sold by L. Sanderson, New Haven. Sampled from stock of J. C. Eddy, Simsbury.

ANALYSES.

	10380	10658
Nitrogen,	20.94	20.94
Equivalent Ammonia,	25.43	25.43
Cost per ton,	$60.00	$65.00
Nitrogen costs cents per pound,	14.3	15.5

At these prices sulphate of ammonia is an expensive source of nitrogen as compared with nitrate of soda and the organic forms, and is not likely to be used much as a fertilizer.

DRIED BLOOD.

This consists of slaughter-house blood which has been dried by superheated steam or hot air. It is a finely pulverized, nearly odorless substance, red or nearly black in color, and rich in nitrogen that is quickly available to vegetation.

10314. Sold by the Bowker Fertilizer Co., Boston, Mass. Sampled from stock of Simeon Pease, by Fred. R. Jennings, Greenfield Hill.

10589. Sold by L. Sanderson, New Haven. Sampled by Geo. H. Bartlett, North Guilford, from stock bought by him.

ANALYSES.

	10314	10589
Nitrogen,	10.70	10.13
Phosphoric Acid,	.....	4.16
Cost per ton,	$28.00	$26.00
Nitrogen costs cents per pound,	13.1	11.4*

Of the nitrogen of **10314**, 87.3 per cent. were soluble in pepsin solution, demonstrating the absence of any such adulterant as ground leather.

*** Allowing 3½ cents per pound for the phosphoric acid.**

COTTON-SEED MEAL.

This material is of two kinds, which are known in trade respectively as undecorticated and decorticated. In their manufacture cotton seed is first ginned to remove most of the fiber, then passed through a "linter" to take off the short fiber or lint remaining, then through machines which break and separate the hulls. The hulled seed is ground and the oil expressed. The ground cake from the presses is used as a cattle food and fertilizer. The hulls are burned for fuel in the oil factory, and the ashes, which contain from 20 to 30 per cent. of potash, are also used as a fertilizer. In case of undecorticated meal, the hulls and the ground press-cake are mixed together.

The only samples received for analysis this year have represented clear, decorticated meal.

In the following table are given the percentages of nitrogen in thirty-four samples. The percentage of phosphoric acid in cotton-seed meal ranges from 2.69 to 3.44, and that of potash from 1.64 to 2.00, the average being 3.15 and 1.90, respectively. The cost per pound of nitrogen is determined in each case by deducting from the ton price $4.42—the valuation of the phosphoric acid and potash,—and dividing the remainder by the number of pounds of nitrogen in the ton of meal.

The average cost of cotton-seed meal has been about $21.50 per ton. The percentage of nitrogen has ranged from 7.04 to 7.97 and has averaged 7.44. The cost of nitrogen per pound has ranged from 10.2 to 12.4 cents, averaging 11.5 cents per pound, the cheapest form of quickly available organic nitrogen in our market.

CASTOR POMACE.

This is the ground residue of castor beans from which castor oil has been extracted. The nitrogen which it contains is quickly available to plants, but the pomace is extremely poisonous to animals, which often eat it greedily when the opportunity offers.

10384. Made by H. J. Baker & Bro., N. Y. city. Stock of Olds & Whipple, Hartford.

10846. Made by H. J. Baker & Bro., N. Y. city. Stock of J. C. Eddy, Simsbury.

10190. Made by H. J. Baker & Bro., N. Y. city. Stock of Olds & Whipple, Hartford.

Analyses of Cotton Seed Meal.

Station No.	Dealer.	Sampled by	Nitrogen.	Cost per ton.	Nitrogen costs cents per pound.
10191	McBride & Co., Memphis, Tenn.,	S. A. Kent, Suffield, Conn.,	7.81	$20.40	10.2
10216	American Cotton Oil Co., New York City,	Edward O. Marsh, New Milford,	7.76	20.50	10.4
10194	W. W. Cooper, Suffield,	C. D. Woodworth, Thompsonville,	7.97	21.50	10.7
10495	Morton Bancroft, Springfield, Mass.,	Henry Derwig, Warehouse Point,	7.56	21.00	11.0
10272	Chapin & Co., Boston,	E. Manchester & Sons, West Winsted,	7.37	20.75	11.0
10357	J. E. Perkins, Suffield,	F. B. Hatheway, Windsor Locks,	7.57	21.25	11.1
10498	W. W. Cooper, Suffield,	Station Agent,	7.60	21.50	11.2
10499	H. K. Brainard, Thompsonville,	Station Agent,	7.61	21.50	11.2
10429	W. W. Cooper, Suffield,	Chas. B. Sheldon, West Suffield,	7.40	21.00	11.2
10298	C. H. Dexter & Son, Windsor Locks,	E. S. Seymour, Windsor Locks,	7.50	21.50	11.4
10370	Bowkers Branch, Hartford,	H. W. Alford, Poquonock	7.38	21.25	11.4
10323	Olds & Whipple, "	Pitcher & Phillips, Thompsonville,	7.58	21.75	11.4
10279	W. W. Cooper, Suffield,	S. O. Ranney, Windsor Locks,	7.22	21.00	11.5
10361	Arthur Sikes, Mapleton,	D. I. King, Windsor Locks,	7.18	21.00	11.5
10500	H. K. Brainard, Thompsonville,	Station Agent,	7.42	21.50	11.5
10215	Ernest N. Austin, Suffield,	H. H. Austin, Suffield,	7.42	21.50	11.5
10308	American Cotton Oil Company,	W. H. Olcott, So. Manchester,	7.55	22.00	11.6
10571	.....	P. P. Hickey, Burnside,	7.43	21.75	11.7
10479	Olds & Whipple, Hartford,	Stanton F. Brown, Poquonock,	7.73	22.50	11.7
10234	Arthur Sikes, Suffield,	G A. Douglass, Thompsonville,	7.34	21.50	11.7
10724	C. M. Cox & Co., Boston, Mass.,	C. J. Dewey, Buckland,	7.20	21.50	11.7
10570	American Cotton Oil Company,	N. T. Case, Tariffville,	7.42	22.00	11.9
10409	C. H. Dexter & Son, Windsor Locks,	Fred. Thrall, Poquonock,	7.10	21.50	12.0
10408	Olds & Whipple, Hartford,	John Du Bon, "	7.10	21.50	12.0
10822	Olds & Whipple, Hartford,	T. P. Kinney, Windsor,	7.29	22.00	12.0
10432	C. F. Tallard & Son, Broad Brook,	C. D. Cannon, Windsor Locks,	7.04	21.50	12.1
10297	Olds & Whipple, Hartford,	Clark Bros., Poquonock,	7.49	22.50	12.1
10278	.....	W. H. Prout, Suffield,	7.54	22.75	12.2
10288	Olds & Whipple, Hartford,	A. E. Holcomb, Poquonock,	7.23	22.50	12.4
10436	Olds & Whipple, Hartford,	A. H. Brown, "	7.30	22.50	12.4
10120	.....	A. E. Plant, Branford,	7.66	.....	....
10179	C. A. Pease & Co., Hartford,	C. A. Pease & Co., Hartford,	7.48	.....	....
10549	Charles M. Cox & Co., Boston, Mass.,	Chas. M. Cox & Co., Boston, Mass.,	7.34	.....	....
10163	L. Sanderson, New Haven	Agricultural Station	7.40	.....	....

10189. Made by H. J. Baker & Bro., N. Y. city. Sampled from stock of Olds & Whipple, Hartford, by E. P. Brewer, Silver Lane.

10845. Sold by the Bowker Fertilizer Co., Boston, Mass. Stock of Newell St. John, Simsbury.

ANALYSES.

	10384	10846	10190	10189	10845
Nitrogen,	5.70	5.50	5.34	5.02	4.60
Phosphoric Acid,	1.60	....	1.64	1.43	....
Potash,	0.95	....	0.77	0.91	....
Cost per ton,	$19.00	$19.00	$19.00	$19.00	$19.00
Nitrogen costs cents per pound,	**14.7**	**15.3**	**15.9**	**16.8**	**18.3**

The percentage of nitrogen in these samples of castor pomace has a rather wide range, 4.60 to 5.70, and the cost of nitrogen per pound is much higher than in cotton seed meal. Many tobacco-growers, however, use castor pomace, believing that it imparts a desirable quality to the wrapper leaf, which is not obtained by cotton-seed meal. The experiments made by this Station for five successive years failed to show any advantage from the use of castor pomace in place of cotton seed meal as a tobacco fertilizer.

RAPE-SEED MEAL.

10220. A sample of this material, made by the Oil Seeds Pressing Co., 15-25 Whitehall street, New York city, and used by J. A. DuBon, Poquonock, in an experiment to test its value as a tobacco fertilizer, contained:

Nitrogen,	5.40 per cent.
Phosphoric Acid,	2.16 "
Potash,	.99 "

In composition it is not unlike castor pomace. As a tobacco fertilizer it did not prove satisfactory in 1898.

II. RAW MATERIALS OF HIGH GRADE CONTAINING PHOSPHORIC ACID AS THE CHIEF VALUABLE INGREDIENT.

DISSOLVED BONE BLACK.

Bone black, made by subjecting bone to a red heat without access of air, is used in sugar refineries to decolorize sugar solutions. The waste bone black, dried and treated with oil of vitriol, makes a "superphosphate" of high grade which does not cake together on standing, but remains as a fine powder suitable for application to the land.

In the following table are given analyses of seven samples of this material.

The cost of available phosphoric acid in dissolved bone black has ranged from 6.0 to 6.9 cents per pound, the average in the seven samples being 6.5 cents.

ANALYSES OF DISSOLVED BONE BLACK AND (☞)

Station No.	Sold by	Sampled from Stock of
	Dissolved Bone Black.	
10721	Quinnipiac Co., Boston,	O. S. Olmsted, Melrose,
10588	Bowker Fertilizer Co., Boston,	A. L. Hitchcock, Plainville,
10260	E. E. Burwell, New Haven,	E. E. Burwell, New Haven,
10274	L. Sanderson, "	E. Manchester & Sons, W. Winsted,
10262	" " "	L. Sanderson, New Haven,
10427	" " "	Chas. B. Sheldon, West Suffield,
10373	" " "	Dennis Fenn, Milford,
	Dissolved Rock Phosphate.	
10643	Geo. F. Taylor's Sons, N. Y. city,	H. C. C. Miles, Milford,
10386	M. L. Shoemaker & Co., Phila.,	Daniels Bros., Middletown,
10385	Bowker Fertilizer Co., Boston,	W. B. Miller, Middlefield,
10458	" " " "	Clifton Peck, Yantic,
10554	Bradley " " "	G. B. Porter, Waterbury,
10741	M. E. Wheeler & Co., Rutland, Vt.,	D. G. Chesebro, Center Groton,
10202	Berkshire Mills Co., Bridgeport,	S. E. Curtis, Stratford,
10250		S. D. Woodruff & Sons, Orange,
10714	Milsom Rendering & Fertilizer Co., East Buffalo, N. Y.,	Manufacturer,
10276	Quinnipiac Co., Boston,	C. Buckingham, Southport,

DISSOLVED ROCK PHOSPHATE OR ACID ROCK.

This material, made by treating various mineral phosphates with oil of vitriol, is the most common source of the phosphoric acid of factory-mixed fertilizers.

In the following table are given ten analyses of dissolved rock phosphate. The composition of the samples is by no means uniform.

The cost of available phosphoric acid ranges from 3.1 to 7.4 cents per pound, the average of six samples being 3.9 cents.

10741 is "Electrical Dissolved Bone," sold by M. E. Wheeler & Co. It is simply dissolved mineral phosphate, sold for about double the price of the other samples.

DISSOLVED ROCK PHOSPHATE.

Phosphoric Acid.				Cost per ton.	"Available" Phosphoric Acid costs cents per pound.
Soluble.	Reverted.	Insoluble.	Total.		
12.90	3.41	.74	17.05	$20 00	6.0
13.92	2.12	.18	16.22	19.50	6.1
11.97	5.04	.45	17.46	22.00	6.4
16.00	.37	.15	16.52	22.00	6.7
15.54	.60	.11	16.25	22.00	6.8
15.39	.86	.16	16.41	22.00	6.8
15.79	....	.51	16.30	22.00	6.9
12.93	2.02	.26	15.21	10.25	3.4
10.59	2.98	1.83	15.40	11.00	3.8
9.34	3.32	1.78	14.44	11.00	4.1
9.63	4.10	1.48	15.21	12.00	4.2
8.67	3.37	2.05	14.09	12.00	4.6
8.98	4.90	1.16	15.04	21.00	7.4
9.22	7.87	.47	17.56	11.00	3.1
12.46	1.42	.83	14.71	....	...
10.19	3.09	.17	13.45	....	...
10.42	3.70	1.62	15.74	....	...

III. RAW MATERIALS OF HIGH GRADE CONTAINING POTASH.

HIGH GRADE SULPHATE OF POTASH.

This chemical should contain over 90 per cent. of pure potassium sulphate (sulphate of potash) or about fifty per cent. of potassium oxide, the same quantity as is supplied by muriate, and should be nearly free from chlorine.

In the table, on pages 32 and 33, are given five analyses of high grade sulphate; all of them of fair quality.

DOUBLE SULPHATE OF POTASH AND MAGNESIA.

This material is usually sold as "sulphate of potash" or "manure salt," on a guarantee of "48-50 per cent. sulphate," which is equivalent to 25.9-27.0 per cent. of potassium oxide. Besides some 46-50 per cent. of potassium sulphate, it contains over 30 per cent. of magnesium sulphate, chlorine equivalent to 3 per cent. of common salt, a little sodium and calcium sulphates, with varying quantities of moisture.

The analyses of eight samples of this material appear in the table on pages 32 and 33. Two of them, Nos. **10294** and **10343,** contain considerably less potash than this material is usually guaranteed to contain, and in two others, **10235** and **10733,** the percentage of potash is rather low.

MURIATE OF POTASH.

Commercial muriate of potash contains about 80 per cent. of muriate of potash (potassium chloride), 15 per cent. or more of common salt (sodium chloride), and 4 per cent. or more of water.

It is generally retailed on a guarantee of 80 per cent. muriate, which is equivalent to 50.5 per cent. of potassium oxide.

The percentages of potash in the seventeen samples whose analyses appear in the table, pages 32 and 33, range from 53.67 to 48.77, and average 51.1 per cent.

KAINIT.

Kainit is less uniform in composition than the other potash salts. It contains from 11 to 15 per cent. of potash, more than that quantity of soda, and rather less magnesia. These "bases" are combined with chlorine and sulphuric acid. Un-

less " calcined " it contains more water than occurs in sulphate or in muriate of potash. It is usually sold on a guarantee of 12 to 15 per cent. of potash, or 23 to 25 per cent. " sulphate of potash." It is not properly called or claimed to be a sulphate of potash, since it contains more than enough chlorine to combine with all the potash present, and there are sound reasons for believing that its potash exists largely as muriate and to a much less extent as sulphate. Its action and effects are unquestionably those of a muriate rather than of a sulphate.

Four analyses of kainit appear in the table, pages 32 and 33. The percentage of potash ranges from 11.14 to 13.80.

In 1898, the cost of potash in the samples of high grade sulphate of potash analyzed at this station, five in number, ranged from 4.6 cents to 5.1 cents per pound, and averaged 4.8.

The cost of potash in the " low grade " or double sulphate of potash and magnesia ranged from 4.9 to 6.8 cents per pound and averaged (8 samples) 5.8 cents, a cent more per pound than in the high grade sulphate.

In eleven samples of muriate of potash, the cost per pound of potash ranged from 3.8 to 4.5 cents per pound, and averaged 4.2 cents, this being the cheapest source of water-soluble potash in the market.

The cost of potash in Kainit ranged from 5.1 cents to 6.3 cents per pound.

ANALYSES OF (☞)

Station No.	Sold by	Sampled from Stock of.
	High Grade Sulphate of Potash.	
10426	L. Sanderson, New Haven,.....	Chas. B. Sheldon, W. Suffield,...
10512	L. Sanderson, New Haven,.....	E. Manchester & Sons, W. Winsted,
10553	Bradley Fertilizer Co., Boston,.....	G. B. Porter, Waterbury,.....
10313	Bowker Fertilizer Co., Boston,.....	F. R. Jennings, Greenfield Hill,..
10345	Bowker Fertilizer Co., Boston,.....	Bowker's Branch, Hartford,.....
	Double Sulphate of Potash and Magnesia.	
10293	Bradley Fertilizer Co., Boston,.....	James P. O'Connor, Wethersfield,
10259	E. E. Burwell, New Haven,.....	E. E. Burwell, New Haven,.....
10261	L. Sanderson, New Haven,.....	L. Sanderson, New Haven,.....
10235	Ernest N. Austin, Suffield,.....	H. H. Austin, Suffield,.....
10379	Quinnipiac Co., Boston,.....	Olds & Whipple, Hartford,.....
10294	Bowker Fertilizer Co., Boston,.....	James P. O'Connor, Wethersfield,
10343	Bowker Fertilizer Co., Boston,.....	Bowker's Branch, Hartford,.....
10733	Bowker Fertilizer Co., Boston,.....	H. K. Brainard, Thompsonville,..
	Muriate of Potash.	
10555	Bradley Fertilizer Co., Boston,.....	G. B. Porter, Waterbury,.....
10257	E. E. Burwell, New Haven,.....	E. E. Burwell, New Haven,.....
10312	Bowker Fertilizer Co., Boston,.....	F. R. Jennings, Greenfield Hill,..
10659	Williams & Clark Fertilizer Co., New York,.....	J. G. Schwink, Meriden,.....
10442	L. Sanderson, New Haven,.....	E. C. Warner, Fair Haven,.....
10305	Rogers & Hubbard Co., Middletown,.	H. W. Andrews, Wallingford,....
10371	L. Sanderson, New Haven,.....	D. Fenn & Son, Milford,.....
10266	L. Sanderson, New Haven,.....	L. Sanderson, New Haven,.....
10344	Bowker Fertilizer Co., Boston,.....	Bowker's Branch, Hartford,.....
10378	Quinnipiac Co., Boston,.....	Olds & Whipple, Hartford,.....
10552	Great Eastern Fertilizer Co., Rutland, Vt.,.....	Wm. M. Tyler, Waterbury,.....
10203	Berkshire Mills Co., Bridgeport,.....	S. E. Curtis, Stratford,.....
10443	Bowker Fertilizer Co., Boston,.....	Clifton Peck, Yantic,.....
10242	.....	S. D. Woodruff & Sons, Orange,...
10248	.....	" " "
10273	.....	E. Manchester & Sons, W. Winsted,
10603	Geo. F. Taylor's Sons, N. York City,	H. C. C. Miles, Milford,.....
	Kainit.	
10433	.....	D. Fenn, Milford,.....
10734	Bowker Fertilizer Co., Boston,.....	H. K. Brainard, Thompsonville,..
10657	Williams & Clark Fertilizer Co., New York,.....	J. G. Schwink, Meriden,.....
10346	Bowker Fertilizer Co., Boston,.....	Bowker's Branch, Hartford,.....

Potash Salts.

Per cent. Potash.	Equivalent Sulphate of Potash.	Equivalent Muriate of Potash.	Cost per ton.	Potash costs cents per pound.
49.39	91.37	.....	$45.00	4.6
48.48	89.69	.....	45.00	4.6
49.83	92.19	.....	47.00	4.7
48.35	89.45	.....	47.00	4.9
47.90	88.62	.....	49.00	5.1
26.62	49.25	.....	26.00	4.9
26.14	48.36	.....	28.00	5.4
25.78	47.69	.....	28.00	5.4
23.96	44.33	.....	28.00	5.8
27.12	50.17	.....	32.00	5.9
22.22	41.11	.....	26.00	5.9
23.03	42.61	.....	30.00	6.5
24.16	44.70	.....	33.00	6.8
52.14	.....	82.38	40.00	3.8
53.00	.....	83.74	41.50	3.9
49.68	.....	78.49	40.00	4.0
50.40	.....	79.63	42 00	4.1
50.22	.....	79.35	42 00	4.2
50.96	.....	80.52	42.50	4.2
50.14	.....	79.22	42 00	4.2
49.39	.....	78.04	42.50	4.3
50.15	.....	79.24	43 00	4.3
50.97	.....	80.53	45.00	4.4
50.50	.....	79.79	45.00	4.5
53.59	.....	84.67	.....	....
50.98	.....	80.55	.....	....
48.77	.....	77.06	.....	....
53.12	.....	83.93	.....	....
53.67	.....	84.80	.....	....
51.91	.....	82.02	40.40	3.9
13.80	25.53	.....	14.00	5.1
12.14	22.46	.....	14.00	5.8
11.74	21.72	.....	14.00	5.9
11.14	20.61	.....	14.00	6.3

HIGH GRADE SCOTCH MURIATE OF POTASH.

This material has a coarser grain than the German muriate. A sample, **10755**, sent by Chas. H. Weekes, 54 Maiden Lane, New York, contained 61.58 per cent. of potash soluble in water, which is about the quantity guaranteed by the manufacturers. Mr. Weekes states that it is sold at a somewhat lower price than the German muriate.

CARBONATE OF POTASH.

10296. A white, dry powder containing many small lumps, sold by the cask at $110.00 per ton. Sampled by Clark Bros., Poquonock. It is used by the Clark Bros. as a potash fertilizer for tobacco, being applied to the land, in solution, from a watering cart. The results are stated by the Clark Brothers to have been most satisfactory, both as regards yield of crop and quality of leaf.

The sample contained 64.55 per cent. of water-soluble potash, equivalent to 94.70 per cent. of carbonate of potash. Actual potash in this material cost 8.5 cents per pound, more than in any commonly used tobacco fertilizer.

SILICATE OF POTASH.

10481. A sample of silicate of potash, mixed with a little peat, which was given to the Station by the German Potash Syndicate for experimental use as a tobacco fertilizer, contained 19.40 per cent. of water-soluble potash and 21.50 per cent. of total potash.

PHOSPHATE OF POTASH.

A sample, **10482**, analyzed for the Storrs Station, contained 51.60 per cent. of potash and 41.23 per cent. of phosphoric acid, both soluble in water.

TOBACCO STEMS.

These consist, not of the stalks, but of the midribs of the leaves, stripped off in cigar factories. They are much used on tobacco lands, and, being free from weed seeds, make an excellent fertilizer and mulch for lawns, applied late in the fall.

10383. Broken tobacco stems. Bought of the P. J. Sorg Co., Middletown, Ohio. **10463.** Ground stems, and **10496**, unground stems; the three samples taken from stock of Olds & Whipple, Hartford.

ANALYSES.

	10383	10463	10496
Nitrogen,	1.55	1.05	1.07
Phosphoric Acid,	.47	.49	1.15
Potash,	4.96	5.60	5.32
Cost per ton,	$15.00	$18.00	$11.50

If we allow 14 and 4 cents per pound for nitrogen and phosphoric acid respectively, the cost of potash per pound, in the three samples, will be 10.4, 13.1, and 7.1 cents. It is evident that if the value of stems as a fertilizer rests wholly in their content of nitrogen, phosphoric acid, and potash they are uneconomical to buy at present prices.

But, like stable manure, they are also valuable for the organic, humus-forming material in them.

IV. RAW MATERIALS CONTAINING NITROGEN AND PHOSPHORIC ACID.

BONE MANURES.

The terms "Bone Dust," "Ground Bone," "Bone Meal," and "Bone" applied to fertilizers, sometimes signify material made from dry, clean, and pure bones; in other cases these terms refer to the result of crushing fresh or moist bones which have been thrown out either raw or after cooking, with more or less meat, tendon, and grease, and—if taken from garbage or ash heaps—with ashes or soil adhering; again they denote mixtures of bone, blood, meat, and other slaughter-house refuse which have been cooked in steam tanks to recover grease, and are then dried and sometimes sold as "tankage"; or finally, they apply to bone from which a large share of the nitrogenous substance has been extracted in the glue manufacture. When they are in the same state of mechanical subdivision the nitrogen of all these varieties of bone probably has about the same fertilizing value.

The method adopted for the valuation of bone manures, which takes account of their mechanical condition as well as chemical composition, is explained on page 19.

1. *Bone Manures Sampled by Station Agents.*

In the following table are given analyses of forty-four samples of bone drawn by the Station agents. See pages 38 and 39.

The average cost per ton has been $29.49; the average valuation $25,55, showing that the Station schedule of valuations for bone has been lower than is justified by the average selling price of bone.

Analyses Requiring Special Notice.

The Bradley Fertilizer Co. was dissatisfied with the results of analysis No. **10394,** pp. 38 and 39, and asked that other samples be drawn and analyzed. Another sample, **10537,** pp. 38 and 39 was accordingly analyzed, which gave higher percentages of both nitrogen and phosphoric acid. Both analyses appear in the table.

The Lowell Fertilizer Co. was dissatisfied with analysis No. **10596,** pp. 38 and 39, stating that this brand usually contained from 2.27 to 2.69 per cent. of nitrogen, while our analysis showed only 2.03 per cent.

Nitrogen was then determined in each of the three samples, with the following results: 2.10, 1.96, 1.86; average, 1.97 per cent.; found in the mixture of the three, 2.03 per cent.

Two samples were then drawn from the stock of the Standard Feed Co., in Bridgeport, **10753** and **10754**; analyses, pp. 38 and 39.

The former was from bags, labeled and tagged, and contained 2.02 per cent. of nitrogen; the latter, from unlabeled bags, said by the manufacturer to be poultry bone, contained 2.25 per cent.

The Lowell Fertilizer Co. next asked that further samples be drawn from a number of places, by representatives of the Station and the Company, which was accordingly done.

The six samples, thus drawn, **10825** to **10830,** both inclusive, are given in the table, and all the analyses of this brand are tabulated below for ready comparison.

Analyses of the Lowell Fertilizer Company's Ground Bone.

MECHANICAL ANALYSES.

	10569	10753	10754	10825	10826	10827	10828	10829	10830
Smaller than $\frac{1}{50}$ inch,	60	68	63	66	65	67	68	60	63
Larger than $\frac{1}{50}$ inch,	40	32	37	34	35	33	32	40	37
Total,	100	100	100	100	100	100	100	100	100

CHEMICAL ANALYSES AND VALUATIONS.

Nitrogen,	2.03	2.02	2.25	1.87	1.90	2.17	1.61	2.23	2.10
Phosphoric acid,	29.31	29.44	28.68	29.07	29.18	28.45	29.58	28.29	29.16
Cost per ton,	$30.00	28.00	28.00	30.00	30.00	30.00	30.00	30.00	30.00
Valuation per ton,	$27.26	27.61	27.40	26.87	27.02	27.21	26.71	26.90	27.41

An inspection of all these analyses shows a tolerably uniform composition, the average of all the percentages of nitrogen being 2.02 per cent., nearly identical with the percentage reported in the first analysis.

Bone Manures Sampled by Manufacturers and by Purchasers.

In the table on pp. 40 and 41 are given analyses of sixteen samples of bone, which were sent by purchasers, and of one sample deposited by a manufacturer representing a brand which was not found in market by our sampling agent.

The Station is responsible for the correct subdivision and analysis of the small samples placed in its possession, but not for the accuracy with which those samples represent the several articles specified,—though it requires that a certificate be filed by the person drawing the sample, stating that it has been fairly drawn according to the printed directions furnished by the Station.

BONE MANURES. SAMPLED BY (☞)

Station No.	Name or Brand.	Manufacturer.
10544	Ground Bone.	E. C. Dennis, Stafford Springs.
10240	Preston's Ground Bone.	Preston Fert. Co., Greenpoint, L. I.
10281	Ground Bone.	Berkshire Mills Co., Bridgeport.
10753	Ground Bone.	Lowell Fertilizer Co., Boston.
10754	Ground Bone.	Lowell Fertilizer Co., Boston.
10255	Armour's Bone Meal.	Armour Fertilizer Works, Chicago.
10546	Ground Bone Meal.	Crocker Fertilizer Co., Buffalo, N.Y.
10541	Pure Ground Bone.	G. W. Miller, Middlefield.
10723	Bone Meal.	Milsom Rend. & Fert. Co., E. Buffalo.
10543	Fine Ground Bone.	L. B. Darling Fertilizer Co., Pawtucket.
10830	Lowell Ground Bone.	Lowell Fertilizer Co., Boston, Mass.
10430	Fine Ground Bone.	L. Sanderson, New Haven.
10569	Ground Bone.	Lowell Fertilizer Co., Boston.
10827	Lowell Ground Bone.	Lowell Fertilizer Co., Boston.
10307	Pure Raw Bone Meal.	Listers Agricultural Chem. Works, Newark, N. J.
10264	Fine Ground Bone.	L. Sanderson, New Haven.
10826	Lowell Ground Bone.	Lowell Fertilizer Co., Boston.
10395	Hubbard's Pure Raw Knuckle Bone Flour.	Rogers & Hubbard Co., Middletown.
10829	Lowell Ground Bone.	Lowell Fertilizer Co., Boston.
10825	Lowell Ground Bone.	Lowell Fertilizer Co., Boston.
10828	Lowell Ground Bone.	Lowell Fertilizer Co., Boston.
10303	Ground Bone.	Hartford Fertilizer Co., Hartford.
10389	Ground Bone.	Wm. McCormack, Wolcott.
10282	Chittenden's Ground Bone.	National Fertilizer Co., Bridgeport.
10393	Fresh Ground Bone.	Bowker Fertilizer Co., Boston.
10397	Pure Ground Bone.	Peck Bros., Northfield.
10545	Hubbard's Strictly Pure Fine Bone.	Rogers & Hubbard Co., Middletown.
10277	Ground Bone.	Plumb & Winton Co., Bridgeport.
10740	Self-Recommending Fertilizer.	Successor to F. Nuhn, Waterbury.
10404	Pure Ground Bone.	Rogers Mfg. Co., Rockfall.
10398	Swift Sure Bone Meal.	M. L. Shoemaker, Philadelphia.
10306	Bone Meal.	M. E. Wheeler, Rutland, Vt.
10540	Bone Meal.	W. E. Brightman, Tiverton, R. I.
10399	Pure Bone Dust.	P. Cooper's Glue Factory, N. York.
10539	Pure Ground Bone.	Lederer & Wolf, New Haven.
10283	Ground Bone.	Downs & Griffin, Derby.
10388	Americus Pure Bone Meal.	Williams & Clark, New York.
10396	Bone Meal.	Quinnipiac Co., Boston.
10542	Cyclone Pure Bone Meal.	Milsom Rend. & Fert. Co., E. Buffalo.
10537	Fine Ground Bone.	Bradley Fertilizer Co., Boston.
10394	Fine Ground Bone.	Bradley Fertilizer Co., Boston.
10548	White Oak Pure Ground Bone.	Clark's Cove Fertz. Co., New York.
10722	Extra Fine Ground Bone.	Cumberland Bone Phos. Co., Boston.
10547	Fine Ground Bone.	Pacific Guano Co., Boston.

STATION AGENT. ANALYSES.

Dealer.	Dealers' cash price per ton.	Valuation per ton.	Percentage difference between cost and valuation.	Chemical Analysis.		Mechanical Analysis.	
				Nitrogen.	Phos. Acid.	Finer than 1/50 inch.	Coarser than 1/50 inch.
Manufacturer.	$22.00	$24.08	*8.6	4.29	21.16	13	87
O. G. Beard, Shelton.	25.00	26.38	*5.2	2.56	27.30	47	53
Manufacturer.	28.00	27.60	1.4	2.93	26.76	63	37
Standard Feed Co., Bridgeport.	28.00	27.61	1.4	2 02	29 44	68	32
Standard Feed Co , Bridgeport.	28.00	27.40	2.2	2 25	28.68	63	37
C. J. Benham, New Haven.	27.00	26.07	3.5	2.85	25.11	62	38
H. C. Porter, Hebron.	28.00						
H. C. Aborn, Ellington.	30.00	27.89	4.0	2.93	26.74	70	30
	29.00						
Manufacturer.	26.00	24.44	6.4	4.08	21.82	20	80
W. T. Anderson & Son, Tolland.	28.00	26.22	6.8	3.25	24 43	55	45
F. L. Hitchcock, Watertown.	30.00	27.45	9.3	3.27	25.32	66	34
A. I. Kinney, Terryville.	30.00						
S. R. Dean, Seymour.	30.00	27.41	9 4	2.10	29.16	63	37
Manufacturer.	30.00	27.39	9.5	4.18	22.23	67	33
Bugbee Bros., Willimantic.	30.00						
J. P. Barstow, Norwich.	32.00	27.26	10.0	2.03	29.31	61	39
A. A. Snow, Clinton.	30.00						
C. W. Lines, New Britain.	30.00	27.21	10.3	2.17	28.45	67	33
M. D. Stanley, New Britain.	27.00						
A. N. Clark, Milford.	28.00	24.89	10.5	2.88	24.75	40	60
	27.50						
Manufacturer.	30.00	27.03	10.9	4.23	21.70	66	34
D. N. Clark, Shelton.	30.00	27.02	11.0	1.90	29.18	65	35
H. W. Andrews, Wallingford.	32.50						
W. C. Bulkley, Forestville.	32.00	28.72	11.4	3.86	25.36	62	38
City Coal & Wood Co., N. Brit'n	35.50						
Bugbee Bros., Willimantic.	30.00	26 90	11.5	2.23	28.29	60	40
C. N. Jones, Wallingford.	30.00	26.87	11.6	1.87	29 07	66	34
S. A. Billings, Meriden.	30.00	26.71	12.3	1.61	29.58	68	32
S A. Billings, Meriden.	29.00	25.83	12.3	2.78	24.92	63	37
Manufacturer.	28.00	24.81	12.9	4.28	22.46	10	90
Manufacturer.	25.00	22.05	13.4	3.26	20.60	25	75
W. O. Goodsell, Bristol.	30.00	26.44	13.4	2.76	26.00	60	40
C. T. Leonard, Norwalk.	32.00						
W. H. Scott, Pequabuck.	28.00	24.38	14.8	4.17	21.33	22	78
Apothecaries' Hall, Waterbury.	32.00						
Manufacturer.	30.00	26.09	15.0	3.98	22.76	43	57
John Bransfield, Portland.	30.00						
Manufacturer.	28.00	24.35	15.0	4.16	19.43	50	50
Manufacturer.	30.00	26.06	15.1	4.13	20.52	69	31
Manufacturer.	30.00	25.89	15.9	4.45	20.88	45	55
John Bransfield, Portland.	30.00						
Olds & Whipple, Hartford.	37.00	31.46	17.6	5.26	24.01	68	32
J. F. Blakeslee, North Haven.	32.00	27.03	18.4	2.44	28.63	46	54
Wm. Crane, Broad Brook.	28.00	23.24	20.5	3.31	20 07	59	41
Apothecaries' Hall, Waterbury.	30.00	24.71	21.4	1.61	27 90	50	50
Edward White, Rockville.	30.00	24.50	22.4	2.48	25.01	48	52
Manufacturer.	30.00	24.41	22.9	1.90	25.97	62	38
Gault Bros., Westport.	30.00	23.71	26.5	2.72	22.20	66	34
Gault Bros., Westport.	30.00						
H. S. Coe, Harwinton.	32 00	24.47	26.7	3.07	22.18	64	36
	31.00						
G. W. Barnes, Poquonock.	35.00	26.54	31.9	3.70	23.14	60	40
P. Schwartz, Chesterfield.	32.00	23.84	34.2	2.90	22.13	60	40
S. A. Billings, Meriden.	33 00						
C. O. Jelliff, Southport.	29.00	23.07	38.7	2 62	21.59	68	32
	32.00						
J. R. Ballard, Thompson.	30.00	21.42	40.0	3.06	18.43	60	40
L. J. Storrs, Mansfield Center.	32.00	19.39	65.0	2.40	17.78	62	38
Jas. W. Nichols, Danielson.	30.00	18.12	65.6	1.98	17 37	64	36

* Valuation exceeds cost.

BONE MANURES, SAMPLED BY MANUFACTURERS (☞)

Station No.	Name or Brand.	Manufacturer or Dealer.
10715	Pure Ground Bone.	Crocker Fertilizer Co., Buffalo, N. Y.
10132	Bone.	Mr. Davis, Rocky Hill, Conn.
10148	Bone.	
10156	Bone.	Swift & Co., Chicago, Ill.
10178	Pure Raw Bone.	The Scientific Fertilizer Co., Pittsburg, Pa.
10192	Nuhn's Self-recommending Fertilizer, made in summer, 1897.	Successor to F. Nuhn, Waterbury.
10193	Nuhn's Self-recommending Fertilizer, made in winter, 1897–'98.	Successor to F. Nuhn, Waterbury.
10226	Bone Fertilizer.	Plumb & Winton Co., Bridgeport.
10238	Raw Wet Butchers' Bone.	
10275	Fine Ground Bone.	Bradley Fertilizer Co., Boston.
10295	Fine Ground Bone.	Bowker Fertilizer Co , Boston.
10309	Fresh Ground Bone.	Bowker Fertilizer Co , Boston.
10461	Pure Ground Bone.	National Fertilizer Co , Bridgeport.
10478	Fresh Ground Bone.	Bowker Fertilizer Co., Boston.
10508	Darling's Ground Bone.	W. W. Cooper, Suffield.
10644	Ground Raw Bone.	George F. Taylor's Sons, New York City.
10840	Strictly Pure Raw Bone.	M. E. Wheeler & Co., Rutland, Vt.

AN EXPERIMENT IN TREATING RAW BONE WITH SULPHURIC ACID.

Mr. C. M. Jarvis of East Berlin had a quantity of raw, wet butcher's bone cut up for poultry good. This treatment left it still very coarse for use as a fertilizer, and being very damp, and full of grease, milling it was out of the question. It has been proposed to treat raw bone with oil of vitriol in quantity only sufficient to convert the phosphoric acid into the dibasic combination ("reverted" phosphoric acid), an operation which is said to greatly increase its availability. This plan was tried with a small lot of this coarse, wet bone, hoping by the means to improve its mechanical condition as well as the availability of the phosphoric acid. Accurate sampling of the treated and untreated bone were, under the circumstances, not possible, but the analyses may serve to show the general effect of the treatment.

Forty pounds of concentrated oil of vitriol, 66°B, were

OR BY PURCHASERS. ANALYSES.

Station No.	Sampled by	Dealers' cash price per ton.	Valuation per ton.	Chemical Analysis.		Mechanical Analysis.	
				Nitrogen.	Phos. Acid.	Fine, smaller than 1/50 inch.	Coarse, larger than 1/50 inch.
10715	Manufacturer.	.....	$27.96	3.88	26.12	36	64
10132	Butler & Jewell, Cromwell.	.....	20.05	3 62	18.18	2	98
10148	C. M. Jarvis, Berlin, Conn.	$13.50*	21.14	3.50	20.16	1	99
10156	C. M. Jarvis, Berlin, Conn.	24.50*	26.87	4.00	24.66	31	69
10178	H. B. Buell, Eastford.	29.00	26.56	3.72	23.63	52	48
10192	A. H. Coe, Waterbury.	.....	27.38	4.79	20.92	58	42
10193	A. H. Coe, Waterbury.	.....	26.99	4 32	22.04	56	44
10226	F. L. Staples, Plattsville.	.....	25.63	3.96	22.20	43	57
10238	C. M. Jarvis, Berlin.	.....	.....	2.87	18.71	.....	..
10275	M. C. Knapp, Danbury.	31.00	22.34	3.04	19.96	55	45
10295	J. P. O'Connor, Wethersfield	27.00	25.81	2.68	25.89	52	48
10309	W. H. Olcott, Manchester.	28.00	26.83	3.08	26.15	49	51
10461	E. C. Warner, Fair Haven.	25.00	21.66	3.24	18.86	47	53
10478	N. S. Gallup, Ledyard.	28.00	23.98	2.94	21.63	70	30
10508	Jos. Frohlinger, Jr., Suffield.	30.00	25.39	2.70	24.05	73	27
10644	H. C. C. Miles, Milford.	22.00	27.57	3.34	24.88	72	28
10840	G. H. Pearson, Bethel.	32.00	26.95	2.42	27.30	70	30

poured into an oil cask over 265 pounds of the raw, wet bone above described, which contained

Nitrogen,	2.87
Water-soluble Phosphoric Acid,	.31
Citrate-soluble " "	10.85
Insoluble " "	8.05
Total " "	19.21
Water,	25.23
Grease,	21.54

The whole mass became hot and boiled, the sulphuric acid drawing water from the bone. It was stirred and mixed as thoroughly as was possible and allowed to stand for some days, when it was weighed, and a sample sent to the Station for analysis.

* Car lot, f. o. b. E. Berlin.

There resulted 270 pounds of a mixture, No. **10237**, containing

Nitrogen,	3.50 per cent.
Water-soluble Phosphoric Acid,	2.85 "
Citrate-soluble Phosphoric Acid,	12.88 "
Insoluble Phosphoric Acid,	3.22 "
Total Phosphoric Acid,	18.95 "

Reckoning the number of pounds of nitrogen and phosphoric acid from these percentages, we have the following comparison:

	The raw bone contained	The acidified bone contained
Nitrogen,	7.6 pounds.	9.5 pounds.
Water-soluble Phosphoric Acid,	.8 "	7.7 "
Citrate-soluble Phosphoric Acid,	27.4 "	34.8 "
Insoluble Phosphoric Acid,	21.3 "	8.7 "
Total Phosphoric Acid,	49.5 "	51.2 "

It is probable that the raw bone did not contain as much citrate-soluble phosphoric acid as the analysis shows, for in order to bring the sample into condition for analysis it was necessary to dry a weighed portion and partially extract the grease. The analysis was made on this dried material and reckoned back to the fresh material. But this fresh bone would have certainly been less soluble in citrate solution than it was after drying and extraction.

The number of pounds of nitrogen and of total phosphoric acid should have been the same in the raw and in the dissolved bone, and the discrepancy is to be explained by the impossibility, under the circumstances, of getting a perfectly representative sample.

The results, however, show that more than half of the "insoluble" phosphoric acid of the raw bone was converted into soluble forms, the whole mass was dried, both by evaporation due to the great heat evolved (305 pounds of bone and acid lost 35 pounds during treatment) and by the "fixation" of water by calcium sulphate formed by the reaction of sulphuric acid and lime. Besides this, the material was made finer in its mechanical condition and further putrefaction was checked.

This method, which may be recommended for bone which has been cut or crushed into small pieces, is not applicable, probably, to coarse, raw bones, which offer a comparatively small surface to the action of oil of vitriol.

TANKAGE.

After boiling or steaming meat scrap, bone, and other slaughter-house waste, fat rises to the surface and is removed, the soup is run off, and the settlings are dried and sold as tankage. As analyses show, tankage has a very variable composition. In general, it contains more nitrogen and less phosphoric acid than bone.

In the table, pages 44 and 45, are given thirteen analyses of this material, five drawn by a Station agent and eight by purchasers.

These analyses show the usual differences in chemical composition.

Some question having been raised as to the quality of Tankage No. **10311,** the pepsin-solubility of its nitrogen was determined and found to be 63.6 per cent., thus demonstrating the absence of any considerable amount of agriculturally inferior nitrogenous matter.

TANKAGE. (☞)

Station No.	Name or Brand.	Dealer.
	Sampled by Station Agent.	*Dealer.*
10258	Blood and Meat.	E. E. Burwell, New Haven.
10459	Tankage.	Clifton Peck, Yantic.*
10267	Blood, Bone, and Meat.	L. Sanderson, New Haven.
10265	Pulverized Bone and Meat.	L. Sanderson, New Haven.
10246	Tankage.	S. D. Woodruff & Sons, Orange.*
	Sampled by Purchaser.	
10181	Tankage.	
10311	Tankage.	Bowker Fertilizer Co., Boston, Mass.
10243	Tankage.	
10153	Tankage.	Sperry & Barnes, New Haven.
10227	Tankage.	Plumb & Winton Co., Bridgeport.
10374	Bone Tankage.	Plumb & Winton Co., Bridgeport.
10204	Tankage.	Berkshire Mills Co., Bridgeport.
10511	Tankage.	Berkshire Mills Co., Bridgeport.

DRY GROUND FISH.

This residue from the manufacture of fish oil is often sprinkled with diluted oil of vitriol, to hinder decay during drying, whereby the fish bones are softened and to some extent dissolved.

Six analyses of this article are given in the table below.

With a single exception, the nitrogen found in these samples is well above the seller's guarantee.

DRY GROUND FISH. (☞)

Station No.	Manufacturer or Wholesale Dealer.	Sampled from Stock of	Dealer's Cash Price per Ton.
10719	Wm. E. Brightman, Tiverton, R. I.	William Crane, Broad Brook,	$28.00
10720	Williams & Clark, New York, .	Daniels Mills Co., Hartford,	29 00
10716	Quinnipiac Co., Boston, . .	Olds & Whipple, Hartford,	30.00
10558	Wilcox Fertilizer Works, Mystic,	Manufacturer, . . .	30.00
		C. M. Smith, East Hartford,	31.00
10717	Luce Bros , Niantic, . .	W. C. Reynolds, E. Haddam,	32.00
10718	Bowker Fertilizer Co., Boston, .	E. F. Miller, Ellington, .	28.00

* Purchaser only.

ANALYSES AND VALUATIONS.

Sampled from Stock of	Dealer's cash price per ton.	Valuation per ton.	Percentage diff. between Cost and Valuation.	Chemical Analysis.		Mechanical Analysis.	
				Nitrogen.	Phosphoric Acid.	Fine, smaller than 1/50 inch.	Coarse, larger than 1/50 inch.
E. E. Burwell, New Haven.	$29.00	$26.29	10.3	9.86	4.04	51	49
Clifton Peck, Yantic.	24.00	19.72	21.7	5.38	8.44	66	34
L. Sanderson, New Haven.	30.00	23.77	26 2	5.68	12.51	70	30
L. Sanderson, New Haven.	34 00	26.34	29.1	4.90	18.55	67	33
S. D. Woodruff & Sons, Orange.	.....	23.41	....	5.53	14.60	40	60
C. M. Jarvis, Berlin.	12.50‡	22.62	44.7†	7.38	9.34	19	81
Fred R. Jennings, Greenfield Hill.	13.00	16.43	20.9†	5.12	4.99	66	34
J. G. Schwink, Jr., Meriden.	20.00	25.16	20 5†	7.51	9.75	53	47
F. T. Bradley, Saybrook.	21.00	23.36	10.1†	8.33	4.06	62	38
F. L. Staples, Plattsville.	25.00	22.91	9.1	5.40	13.16	57	43
D. Fenn & Son, Milford.	25.00	22.24	12.4	4.90	13.48	63	37
S. E. Curtis, Stratford.	.....	24.03	...	6.15	13.07	46	54
E. Manchester & Sons, West Winsted.	.....	26.80	....	9.46	4.77	64	36

MIXED FERTILIZERS.

BONE AND POTASH AND BONE AND WOOD ASHES.

10582. Bone and wood ash fertilizer, made by Bowker Fertilizer Co., Boston, Mass. Stock of S. E. Brown, Collinsville, and A. L. Hitchcock, Plainville.

10704. Ground bone and potash, made by The E. F. Coe

ANALYSES AND VALUATIONS.

Valuation per Ton.	Percentage Difference between Cost and Valuation.	Nitrogen.				Phosphoric Acid.						
		Nitrogen as Ammonia.	Nitrogen, Organic.	Tot. Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.	
				Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.
$29.64	5.5†	.22	8.42	8.64	7.4	.59	5.21	1.84	7.64	7.0	5.80	..
30.51	4.9†	.32	8.74	9.06	7.4	.94	4.56	1.61	7.11	7.0	5.50	..
30.55	1.8†	.30	8.90	9 20	7.1	.70	4.36	1.67	6.73	7.0	5.06	..
30.22	0.7†	.20	8.72	8.92	8.5	.61	4.83	2.07	7.51	6.0	5.44	..
29.83	7.3	1.50	6.86	8.36	8.2	.93	6.48	1.00	8.41	...	7.41	..
20.47	36.8	.34	5.36	5.70	6.6	1.22	3.62	1.28	6 12	6.0	4.84	..

‡ Car lot price.
† Valuation exceeds cost.

Fertilizer Co., New York city. Stock of Gault Bros., Westport.

10705. Bone and potash, made by Lister's Agricultural Chemical Works, Newark, N. J. Stock of A. W. Hutchinson, Gilead, and W. B. Martin, Rockville.

ANALYSES AND VALUATIONS.

	10582	10704	10705
Nitrogen of Nitrates,	0.73	....	....
Nitrogen, organic,	1.24	2.05	....
Nitrogen, total,	1.97	2.05	....
Soluble Phosphoric Acid,	....	....	5.28
Reverted Phosphoric Acid,	8.11	....	3.01
Insoluble Phosphoric Acid,	4.95	....	0.58
Total Phosphoric Acid,	13.06	17.31	8.87
Potash as Muriate,	1.13	2.55	5.23
Potash as Sulphate,	1.27	....	....
Potash total,	2.40	2.55	5.23
Cost per ton,	$25.10	28.00	24.00
Valuation per ton,	$16.07	20.09	11.84

The potash in sample **10582** is stated to be from wood ashes. The sample contained some chlorine, and a corresponding quantity of potash has therefore been reckoned as muriate, following the practice noted on page 18. The potash is probably present chiefly in the form of carbonate.

Sample **10705** does not contain bone, but is a mixture of dissolved phosphate and potash salts.

NITROGENOUS SUPERPHOSPHATES AND GUANOS.

Here are included those mixed fertilizers containing nitrogen, phosphoric acid, and in most cases, potash, which are not designed by their manufacturers for use on any special crop. "Special Manures" are noticed further on.

1. *Samples drawn by Station Agents.*

In the tables on pages 50 to 61 are given analyses of 119 samples belonging to this class, arranged according to the percentage differences between their cost prices and valuations.

Guarantees.

Of the one hundred and nineteen analyses of nitrogenous superphosphates given in the tables, twenty-three are below the manufacturer's minimum guarantee, in respect of one ingredient, and three in respect of two ingredients

The number which failed to come up to the guarantee is relatively about the same as in the previous year.

There are only seven failures to meet the guarantee on nitrogen, the most costly ingredient, and eight failures in phosphoric acid; but in five of these the failure is in total phosphoric acid, while the "available" phosphoric acid is well above the guarantee. There are sixteen failures to meet the guaranteed percentage of potash. The larger number of these are probably explained by the difficulty of securing uniform mixture of the potash salts and the use of the foreign analyses of potash salts in calculating formulas for mixtures. These analyses do not always fairly represent the goods, after the vicissitudes of ocean freighting, lightering, and storage.

Usually the deficiency of one ingredient in the mixture has been made up by a surplus of another, indicating that the lack of agreement between actual and guaranteed composition was caused by defects in mixing or by a mechanical separation of the ingredients after mixing.

Cost and Valuation.

Cost.

The method used to ascertain the retail cost price of the superphosphates is as follows:

The sampling agents inquire and note the price at the time each sample is drawn. The analysis, when done, is reported to each dealer from whom a sample was taken, with an enclosed postal card addressed to the Station, and a request to note on it whether the retail cash price is correctly given and to mail to the Station.

From the data thus obtained the average prices are computed.

Valuation.

The valuation has been computed in all cases in the usual manner as explained on page 18.

Percentage difference given in the table shows the percentage excess of the cost price over the average retail cost of the

nitrogen, phosphoric acid, and potash contained in the fertilizer.

This information enables the purchaser to estimate the comparative value of different brands and to determine whether it is better economy to buy the commercial mixed fertilizers of which so many are now offered for sale, or to purchase and mix for himself the raw materials.

Which plan is preferable can only be determined by each individual farmer, who should know best what his soil and crops need and what his facilities for purchase and payment are.

In case a fertilizer has sold at two or more different prices, the *manufacturer's price*, when known, has been used in calculating percentage difference.

Otherwise an *average, or nearly average price*, forms the basis of comparison between cost and valuation. The price thus employed is printed in heavy-faced type.

The average cost of the nitrogenous superphosphates is $29.22. The average valuation is $19.30, and the percentage difference 51.4.

Last year the corresponding figures were:

Average cost $30.44, average valuation $20.75, percentage difference 46.9.

These valuations, it must be remembered, are based on the assumption that the nitrogen, phosphoric acid, and potash in each fertilizer are of good quality and readily available to farm crops. Chemical examination shows conclusively whether this is true in respect of potash and phosphoric acid, but gives little or no clue as to the availability of the organic nitrogen of mixed goods. This Station has been for some years, and is still, engaged in a study of methods for determining approximately the relative availability of nitrogen.

Since various inferior or agriculturally worthless forms of nitrogen are in the market and are known to be used in compounding fertilizers, and cannot as yet be detected with certainty by analysis, the only security of purchasers of mixed fertilizers is in dealing with firms which have the highest reputation and are able to satisfy their customers that they use the best raw materials, and in avoiding " cheap " goods offered by irresponsible parties.

Analyses Requiring Special Notice.

10407. E. Frank Coe's Long Islander Market Garden Special, page 50, is not on sale by agents in this State, but is sold direct from the factory to farmers in certain districts.

The manufacturer states that the analysis given on pp. 50 and 51 does not fairly represent the average quality of this brand, which should never show less than 9.5 per cent. of available phosphoric acid.

10390. Fairchild's Formula for Corn and General Crops, made by the Rogers & Hubbard Co., Middletown. The analysis, page 50, was made on a mixture of two samples. The one from stock of Mr. Kilbourne, we were informed, after making the analysis, represented stock carried over from last year.

10559. Fish and Potash, made by The Rogers Manufacturing Co., is below the guarantee in nitrogen, page 54. At the request of the manufacturers, another sample was drawn, **10735,** page 52, which contained a much higher percentage of nitrogen.

10419. Farmers' New Method, made by The Bradley Fertilizer Co., Boston, Mass., page 54. The percentage of potash being below the guarantee, other samples were drawn at the request of the manufacturer, and analysis **10729,** page 54, was made on a mixture of them. This contained the guaranteed amount of potash.

10685. Gold Brand Excelsior Guano, made by The E. Frank Coe Co., New York city. Sampled from stock of Edgar Brewer & Son, Hockanum. See pp. 60 and 61. The manufacturer stated that this sample did not fairly represent the average quality of the brand, which should contain about 6.3 per cent. of potash, and requested that other samples be drawn. Accordingly a sample was drawn from stock of L. C. Grant, Talcottville, the only dealer who had any of the goods on hand in July.

The analysis **10772,** pp. 56 and 57, show 5.02 per cent. of potash, while the first analysis showed but 4.73 per cent.

Inferior Forms of Nitrogen.

The analysis **10445,** given in the tables, p. 60, is of a Fertilizer, made by the Connecticut Reduction Co., of Bridgeport. This fertilizer is stated to be made in part, at least, of city garbage. The tests made on other samples, which are described on page 62, make it quite probable that the nitrogen of this material is of very inferior value as plant food. For this reason no " valuation " is given.

Nitrogenous Superphosphates and Guanos, Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10340	Buckingham XX Formula.	C. Buckingham, Southport.	Manufacturer.	$30.00
10684	Fertilizer.	Conn Valley Orchard Co., Berlin.	Manufacturer.	25.00
10626	Manchester's Formula.	E. Manchester & Sons, West Winsted.	R. D. Wilson, Winsted.	29.00
			Manufacturer.	29.00
10708	Harvest Home Fertilizer.	H. J. Baker & Bro., N Y	W F. Andross, E. Hartf'd	25.00
10407	Long Islander Market Garden Special.*	E. Frank Coe, New York.	G. S. Jennings, Southport	28.00
10602	Complete Fertilizer for Potatoes and Gen'l Crops.	F. E. Boardman, Little River.	Manufacturer.	28.00
10742	Bone, Fish, and Potash.	E R. Kelsey, Branford.	Loomis Bros., Granby.	24.00
10650	Complete Manure.	Standard Fert Co., Boston	E. M. Olmsted, Chester.	28.00
10391	Pure Fine Bone Dissolved in Sulphuric Acid.	Mapes F. & P. G. Co, New York.	Mapes Branch, Hartford.	29.00
			C W. Atwood, Watertown.	31.00
				30.00
10390	Fairchild's Formula for Corn and Gen'l Crops.*	The Rogers & Hubbard Co., Middletown, Conn	City Coal & Wood Co., New Britain.	44.00
			A. E. Kilbourne, E. Hartford.	.....
10646	Hubbard's All Crops, All Soils.	The Rogers & Hubbard Co., Middletown	John Bransfield, Portland	28.00
			J. P. Barstow, Norwich.	28.00
10695	Unexcelled Phosphate.	G. W. Miller, Middlefield.	Manufacturer.	30.00
10452	Ammoniated Bone with Potash.	Armour Fertilizer Works, Chicago.	C. J. Benham, N. Haven	25.00
			Wilson & Burr, Middletown.	28.00
				26.50
10474	Bone, Fish, and Potash.	Luce Bros., Niantic.	Cromwell Co-operative Store, Cromwell.	29.00
			Manufacturer.	24.00
			F. A. Beckwith, Niantic.	25.00
			P. Schwartz, Chesterfield.	25.00
10743	Fisherman's Brand Fish and Potash.	Bowker Fertilizer Co., Boston.	F. T. Bradley, Saybrook.	25.00
			G. F. Walters, Guilford.	24.00
			Bowker's Branch, Hartford	26.00
			W. H. Todd, No. Haven	18.00
10460	Middlesex Special.	Bowker Fert. Co., Boston.	W. H. Baldwin, Meriden.	25.00
10653	Bay State Special.	H. F. Tucker & Co., Boston	Alfred Sneider, Rockville	32.00
10447	Market Garden.	Bowker Fertilizer Co., Boston.	W H. Todd, No. Haven	32 00
			Peck Bros, West Cheshire	36.00
				33.00
10519	All Soluble.	Armour Fertilizer Works, Chicago.	Adams & Canfield, Winnipauk.	30.00
			E. W. Buck, Willimantic.	33.00
				31.50
10667	Pequot Fish and Potash.	Quinnipiac Co, Boston.	A. J. Martin, Wallingford	22.00
10617	Animal Fertilizer.	L. B. Darling Fertilizer Co., Pawtucket, R. I.	A. I. Kinney, Terryville.	30.00
			Hotchkiss & Templeton, Waterbury,	34.00
				32.00
10614	Blood, Bone, and Potash.	L. B. Darling Fertilizer Co., Pawtucket, R. I.	Loomis Bros., Granby	35.00
			Hotchkiss & Templeton, Waterbury.	37.00
				36.00
10581	Complete Fertilizer.	Berkshire Mills Co., Bridgeport.	Johnson Bros., Jewett City	31.00
			A. C. Taintor, Colchester	35.00
			Manufacturer.	32.00
10641	G. G. Bay State Fertilizer.	Clark's Cove Fert. Co., N.Y.	H. E. Daniels, N. London.	24.00

* See page 49.

ANALYSES—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen. Found.	Total Nitrogen. Guaranteed.	Soluble.	Reverted.	Insoluble.	Total. Found.	Total. Guaranteed.	Available. Found.	Available. Guaranteed.	Found. As Muriate.	Found. Total.	Guaranteed.
$28.87	3.9	1.25	....	3.17	4.42	*4.1*	6.05	3.74	1.42	11.21	*10.0*	9.79	*5.0*	0.55	7.81	*6.0*
23.39	6.9	1.29	....	2.94	4.23	*4.1*	6.21	3.29	2.30	11.80	..	9.50	*9.0*	3.14	3.14	*3.0*
26.26	10.4	0.70	....	3.47	4.17	*3.5*	6.30	1.42	0.24	7.96	*7.5*	7.72	....	3.92	8.40	*8.0*
22.22	12.5	4.21	....	1.22	5.43	*1.0*	4.30	1.86	1.22	7.38	*9.0*	6.16	*8.0*	2.35	2.35	*2.0*
24.11	16.1	..	0.90	2.55	3.45	*3.5*	7.10	1.42	1.66	10.18	*11.0*	8.52	*9.0*	0.52	6.34	*6.0*
23.92	17.1	...	...	3.00	3.00	*2.5*	6.22	1.83	0.28	8.33	....	8.05	*7.0*	9.82	9.82	*10.0*
20.18	18.9	....	0.54	3.18	3.72	*3.3*	2.94	2.63	0.67	6.24	*4.0*	5.57	....	0.59	4.84	*4.0*
22.98	21.8	1.26	....	2.06	3.32	*3.3*	4.38	3.81	1.40	9.59	*9.0*	8.19	*8.0*	7.50	7.50	*7.0*
23.99	25.0	....	....	2.91	2.91	*2.1*	3.68	13.63	4.08	21.39	*12.0*	17.31	..	.....	.....	....
34.90	26.1	3.37	....	2.25	5.62	*5.5*	....	....	....	13.34	*12.0*	.....	....	12.41	12.41	*12.5*
21.81	28.4	0.92	....	1.94	2.86	*2.3*	7.33	4.48	1.89	13.70	*12.0*	11.81	*10.0*	3.59	3.59	*3.0*
23.16	29.5	....	....	2.71	2.71	*2.0*	4.82	3.97	1.64	10.43	*10.5*	8.79	....	8.69	8.69	*9.0*
20.45	29.6	....	....	3.00	3.00	*2.5*	2.02	6.15	3.79	11.96	*8.0*	8.17	*6.0*	0.55	3.87	*3.0*
18.46	30.0	....	1.00	2.31	3.31	*3.0*	2.06	3.06	0.70	5.82	*4.0*	5.12	....	1.47	4.83	*4.0*
18.32	31.0	....	0.14	2.50	2.64	*2.3*	3.61	2.41	3.37	9.39	*6.0*	6.02	*4.0*	5.18	5.18	*5.0*
19.05	31.2	....	....	2.41	2.41	*2.1*	4.85	2.95	1.60	9.40	*8.0*	7.80	...	5.80	5.80	*6.0*
24.09	32.8	0.89	...	2.55	3.44	*3.3*	2.88	6.14	2.35	11.37	*9.0*	9.02	*8.0*	7.29	7.29	*7.0*
24.74	33.4	0.64	....	2.28	2.92	*2.3*	4.99	1.87	1.15	8.01	*8.0*	6.86	*6.0*	12.06	12.06	*10.0*
23.59	33.5	....	0.62	2.87	3.49	*2.9*	3.52	5.94	1.50	10.96	*10.0*	9.46	*8.0*	0.29	5.33	*4.0*
16.26	35.3	....	0.32	2.57	2.89	*2.1*	1.73	4.14	3.33	9.20	*7.0*	5.87	*6.0*	2.30	2.30	*2.0*
23.26	37.6	0.32	....	3.72	4.04	*3.3*	4.16	5.37	0.96	10.49	*10.0*	9.53	*6.0*	4.22	4.22	*4.0*
26.09	38.0	0.63	0.28	3.13	4.04	*4.5*	4.74	5.18	0.52	10.44	*9.0*	9.92	*7.0*	7.40	7.40	*7.0*
23.13	38.3	0.67	0.12	2.11	2.90	*2.5*	5.73	4.73	1.22	11.68	*10.0*	10.46	*8.0*	6.72	6.72	*6.0*
17.20	39.5	....	..	2.22	2.22	*1.9*	6.05	3.89	1.47	11.41	*10.0*	9.94	*8.5*	2.15	2.15	*2.0*

Nitrogenous Superphosphates and Guanos, Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10679	Concentrated Phosphate.	Cumberland Bone Phosphate Co., Boston.	Kahn Bros., Yantic.	$34.00
10706	Old Reliable Superphosphate.	L. Sanderson, New Haven.	R. M. Goodale, Durham.	30.00
			A. B. Morse & Son, Guilford.	28.00
				29.00
10697	Cecrops.	Fred'k Ludlam, N. York.	S. A. Smith, Clintonville.	34.00
10472	Complete Manure for Light Soils.	Mapes F. & P. G. Co., New York.	Mapes Branch, Hartford.	39.00
			J. P. Barstow, Norwich.	40.00
10712	Anchor Brand Fish and Potash.	Bradley Fertilizer Co., Boston.	Manufacturer.	27.00
10628	Ammoniated Bone Superphosphate.	Crocker Fertilizer Co., Buffalo, N. Y.	Latimer & Williams, So. Coventry.	31.00
			Smith & Sons, West Cornwall.	25.00
				28.00
10608	Market Garden Manure.	Lowell Fertilizer Co., Boston.	W. D. Penfield, Cobalt.	40.00
			N. N. King, Thompsonville	38.00
			J. F. Sheridan & Bro., Manchester.	40.00
				39.00
10423	Market Garden Manure.	Quinnipiac Co., Boston.	C. Buckingham, Southport.	33.00
			Gault Bros., Westport.	36.00
				34.50
10663	High Grade Farm's Friend	Read Fertilizer Co., N. Y.	B H. Saunder, Collinsville.	36.00
10449	Gardeners' Complete Manure.	Packer's Union Fertilizer Co., New York.	A. S. Bennett, Cheshire.	35.00
			Walter Gildersleeve, Gildersleeve.	40.00
10707	Swift Sure Superphosphate for General Use.	M. L. Shoemaker & Co., Philadelphia.	J. P. Barstow, Norwich.	36.00
			Daniels Bros., Middletown.	35.00
			W. W. Cooper, Suffield.	35.00
			Olds & Whipple, Hartford.	35.00
10689	High Grade Complete Manure.	Cleveland Dryer Co , Boston.	C. E. Main, Plainfield.	34.00
10735	Fish and Potash.*	Rogers Mfg. Co., Rockfall, Conn.,	Manufacturer.	28.00
10568	High Grade Fish and Potash.	Wilcox Fertilizer Works, Mystic.	W. A. Howard, Woodstock	29.00
			Manufacturer.	30.00
			I. W. Dennison, Mystic.	27.00
10732	Market Garden Manure.	Quinnipiac Co , Boston.	Osborn & Co., Branford.	35.00
			O. S. Olmsted, Melrose.	34.00
				34.50
10699	Animal Fertilizer, G. Brand	L. B. Darling Fertilizer Co , Pawtucket.	Hotchkiss & Templeton, Waterbury.	32.00
10670	High Grade Gen. Fertiz'r.	Pacific Guano Co., Boston.	J. A. Nichols, Danielson.	34.00
10484	Essex XXX Fish and Potash.	Russia Cement Co., Gloucester, Mass.	C. N. Jones, Wallingford.	28.00
			L. A. Carrier, Berlin.	30.00
				29.00
10620	Vegetable Bone Fertilizer.	Milsom Rend. and Fertilizer Co., East Buffalo, N. Y.	D E. Doolittle, West Cheshire.	36.00
			G. W. Barnes, Poquonock.	32.00
				34.00
10579	Standard U. X. D. Fertil'r.	H. J. Baker & Bro., N.Y.	I. J. Scoville, Plainville.	25.00
10616	Dissolved Bone and Potash.	L. B. Darling Fertilizer Co., Pawtucket.	Hotchkiss & Templeton, Waterbury.	36.00
			F. L. Hitchcock, Watertown.	38.00
				37.00

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ANALYSES—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$24.32	39.8	0.89	...	2.51	3.40	*3.3*	2.88	6.69	2.20	11.77	*11.0*	9.57	*8.0*	7.25	7.25	*7.0*
20.67	40.3	0.20	0.16	2.32	2.68	*2.0*	3.94	6.84	3.16	13.94	*10.0*	10.78	*7.0*	3.44	3.44	*2.0*
24.21	40.4	1.29	....	2.18	3.47	*3.0*	6.98	2.48	1.00	10.46	....	9.46	*7.0*	7.17	7.17	*7.0*
27.71	40.7	0.68	1.10	3.74	5.52	*4.9*	2.24	4.38	1.80	8.42	*8.0*	6.62	*6.0*	7.23	7.23	*6.0*
19.09	41.4	....	....	3.60	3.60	*3.3*	2.91	3.37	1.46	7.74	*5.0*	6.28	*3.0*	3.13	3.58	*3.0*
19.70	42.1	....	....	3.17	3.17	*2.9*	7.01	3.96	0.70	11.67	....	10.97	*10.0*	1.25	1.25	*1.1*
27.31	42.8	....	0.84	4.06	4.90	*4.1*	6.29	0.98	0.35	7.62	*8.0*	7.27	*7.0*	0.49	7.08	*6.0*
24.14	42.9	0.68	1.04	1.74	3.46	*3.3*	4.58	4.93	1.80	11.31	*9.0*	9.51	*8.0*	6.83	6.83	*7.0*
25.18	43.0	....	0.42	3.02	3.44	*3.3*	4.16	2.16	1.00	7.32	*6.0*	6.32	....	11.38	11.38	*10.0*
24.46	43.1	....	....	2.74	2.74	*2.5*	6.75	2.08	1.07	9.90	....	8.83	*8.0*	1.27	8.81	*10.0*
24 44	43.2	0.89	...	1.97	2.86	*2.5*	9.38	3.15	1.90	14.43	....	12.53	....	0.09	4.90	*4.0*
23.67	43.6	1.24	....	2.18	3.42	*3.3*	4.53	4.10	1.44	10.07	*9.0*	8.63	*8.0*	7.54	7.54	*7.0*
19.48	43.7	..	0.38	2.84	3.22	*3.3*	1.97	4.64	2.64	9.25	*6.0*	6.61	....	4.62	4.62	*3.8*
20.07	44.5	....	0.40	3.32	3.72	*3.3*	3.54	2.42	0.65	6.61	*6.0*	5.96	*6.0*	5.01	5.01	*4.0*
23.77	45.1	1.68	....	1.78	3.46	*3.3*	3.66	5.01	1.88	10.55	*10.0*	8.67	*8.0*	7.49	7.49	*7.0*
21.95	45.8	....	0.22	3.00	3.22	*2.0*	3.42	6.87	1.35	11.64	7.0	10.29	*5.0*	4.48	4.48	*4.0*
23.27	46.1	1.88	....	1.56	3.44	*3.3*	4.39	4.12	1.51	10.02	*9.0*	8.51	....	7.25	7.25	*7.0*
19.77	46.7	....	....	2.68	2.68	*2.1*	6.16	4.34	3.55	14.05	*12.0*	10.50	....	2.16	2.16	*2.3*
23.09	47.2	....	....	3.86	3.86	*4.1*	6.86	1.69	1.20	9.75	*9.0*	8.55	*8.0*	5.03	5.03	*5.0*
16 97	47.3	0.26	0.98	1.01	2.25	*1.9*	5.10	3.73	1.98	10.81	*9.0*	8.83	*8.0*	2.78	2.78	*2.3*
25 04	47.8	0.06	0.26	2.10	2.42	*1.5*	5.55	7.61	0.90	14.06	*13.0*	13.16	*11.0*	8.02	8.02	*7.0*

Nitrogenous Superphosphates and Guanos, Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10483	Formula A.	L. Sanderson, New Haven.	F. O. Ives, W. Cheshire.	35.00
			R. M. Goodale, Durham.	35.00
			A. B. Morse & Son, Guilf'd.	33.00
10583	Fish and Potash, Square Brand.	Bowker Fertilizer Co., Boston.	E. F. Miller, Ellington.	27.00
10392	Circle Brand Ground Bone with Potash.	Bradley Fertilizer Co., Boston.	C. O. Jelliff, Southport.	28.00
10660	Great Planet A.	Clark's Cove Fertilizer Co., New York.	Wells & Dean, Bloomfield.	37.00
10354	Fish and Potash.	National Fertilizer Co., Bridgeport.	G. A. & H. B. Williams, East Hartford.	30.00
			Manufacturer.	.....
10473	Standard Pure Bone Superphosphate.	Lister's Agricult'l Chemical Works, Newark, N. J.	A. N. Clark, Milford.	28.00
			A. W. Hutchinson, Gilead.	28.00
10700	Garden Special Fertilizer.	Great Eastern Fertilizer Co., Rutland, Vt.	Silas Finch, Greenwich.	34.00
10655	Superior Truck Fertilizer.	M. E. Wheeler & Co., Rutland, Vt.	I. J. Scoville, Plainville.	36.00
10559	Fish and Potash.*	Rogers Manufacturing Co., Rockfall, Conn.	Manufacturer.	28.00
			W. T. Andross, E. Hartf'd.	30.00
10425	Complete Fertilizer.	National Fertilizer Co., Bridgeport.	G. A. & H. B. Williams, East Hartford.	38.00
			J. F. Buckhout, Greenw'ch.	38.00
			A. G. Beach, Seymour.	37.00
			Manufacturer.	35.00
10683	Vegetable Bone Superphosphate.	Crocker Fertilizer Co., Buffalo, N. Y.	The Meeker Coal Co., Norwalk.	41.00
10729	New Method Fertilizer.*	Bradley Fertilizer Co., Boston.	H. S. Harvey, Windham Center.	28.00
			Sanford & Hawley, Unionville.	26.00
			Wilson & Burr, Middlet'n.	30.00
10493	Success Fertilizer.	Lister's Agricult'l Chemical Works, Newark, N. J.	M. D. Stanley, N. Britain.	25.00
			A. W. Hutchinson, Gilead.	26.00
10751	Special Manure, 10 per cent. Potash.	L. Sanderson, New Haven.	A. B. Morse & Son, Guilford.	33 00
				35.00
10578	Ammoniated Bone Phosphate.	Berkshire Mills Co., Bridgeport.	Johnson Bros., Jewett City.	28.00
			T. H. Eldridge, Norwich.	28.00
			Manufacturer.	28.00
10565	Complete Bone Superphosphate.	Wilcox Fertilizer Works, Mystic.	W. A. Howard, Woodst'k.	29.00
			Manufacturer.	30.00
			F. A. Rathbun, Hebron.	32.00
10682	A. A. Complete Manure.	Crocker Fertilizer Co., Buffalo, N. Y.	C. F. Tallard & Son, Broad Brook.	35.00
10356	Chittenden's Market Garden.	National Fertilizer Co., Bridgeport.	Manufacturer.	32.00
10419	Farmers' New Method.*	Bradley Fertilizer Co., Boston.	D. L. Clark, Milford.	28.00
			W. H. Scott, Pequabuck.	29.00
				28 50
10488	Dissolved Bone and Potash.	Milsom Rend. and Fertilizer Co., East Buffalo, N. Y.	D. E. Doolittle, West Cheshire.	17 50
			Chas. H. Davis, Guilford.	18.00

* See page 49.

ANALYSES.—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$23.28	50.3	0.46	0.66	1.98	3.10	*3.0*	5.17	4.77	2.12	12.06	*10.0*	9.94	*8.0*	6.32	6.32	*6.0*
17.93	50.6	...	0.33	2.59	2.92	*2.3*	3.23	3.47	1.60	8.30	*8.0*	6.70	....	4.04	4.04	*4.0*
18.39	52.3	....	....	2.62	2.62	*1.9*	1.94	6.78	4.32	13.04	*10.0*	8.72	*6.0*	2.53	2.53	*2.0*
24.26	52.5	0.77	0.52	2.31	3.60	*3.3*	3.62	5.37	2.40	11.39	*9.0*	8.99	*8.0*	6.84	6.84	*7.0*
19.66	52.6	....	....	3.07	3.07	*3.0*	3.86	2.52	2.82	9.20	*6.0*	6.38	....	0.45	4.51	*4.0*
18.13	54.4	....	....	2.32	2.32	*2.4*	8.93	1.86	1.30	12.09	*12.0*	10.79	*10.0*	1.86	1.86	*1.5*
22.02	54.4	....	....	3.22	3.22	*3.3*	4.96	2.15	0.90	8.01	....	7.11	*6.0*	7.60	7.60	*8.0*
23.24	54.9	....	0.17	3.15	3.32	*3.5*	5.90	1.55	0.89	8.34	....	7.45	*7.0*	8.27	8.27	*8.0*
18.00	55.6	....	0.23	2.58	2.81	*3.3*	1.28	3.89	4.58	9.75	*6.0*	5.17	....	4.77	4.77	*3.8*
23.73	55.9	....	1.52	2.05	3.57	*3.3*	4.29	5.42	0.92	10.63	*10.0*	9.71	*8.0*	6.07	6.07	*6.0*
26.05	57.4	....	2.22	2.90	5.12	*5.0*	5.41	2.01	0.31	7.73	....	7.42	*6.0*	6.01	6.01	*6.0*
17.75	57.7	....	....	2.21	2.21	*1.7*	5.66	3.86	1.92	11.44	*10.0*	9.52	*8.0*	3.07	3.07	*3.0*
15.83	57.9	....	....	1.58	1.58	*1.7*	7.81	2.53	1.06	11.40	*11.5*	10.34	*9.5*	1.80	2.21	*2.0*
22.06	58.6	0.69	0.10	1.71	2.50	*2.5*	2.86	3.97	2.65	9.48	*8.0*	6.83	*6.0*	9.87	9.87	*10.0*
17.58	59.3	....	....	2.07	2.07	*1.7*	4.53	4.80	3.35	12.68	*10.0*	9.33	*8.0*	0.47	2.59	*2.0*
18.75	60.0	....	....	2.72	2.72	*2.0*	2.37	5.31	3.90	11.58	*9.0*	7.68	*8.0*	3.75	3.75	*3.0*
21.84	60.3	....	0.27	3.10	3.37	*3.3*	4.97	2.24	1.04	8.25	....	7.21	*8.0*	6.73	6.73	*7.5*
19.95	60.4	....	1.13	1.35	2.48	*2.5*	3.89	4.56	1.57	10.02	*9.0*	8.45	*7.0*	6.15	6.15	*6.0*
17.71	60.9	....	....	2.16	2.16	*1.7*	5.94	3.86	2.15	11.95	*10.0*	9.80	*8.0*	2.77	2.77	*3.0*
10.81	61.9	....	....	...	....	....	7.14	3.56	0.20	10.90	*11.0*	10.70	*9.0*	1.71	1.71	*1.7*

NITROGENOUS SUPERPHOSPHATES AND GUANOS, SAMPLED BY THE STATION.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10448	High Grade Ammoniated Bone Superphosphate.	E. Frank Coe Co., New York.	E. Brewer & Son, Hockanum.	.....
			J. R. Babcock, Mystic.	$29.00
			J. P. Barstow, Norwich.	32 00
				30 00
10638	Americus Ammoniated Bone Superphosphate.	Williams & Clark, New York.	D. B. Wilson, Waterbury.	30.00
			A. B. Garfield, E. Canaan.	33.00
				31 50
10353	Complete Manure. A Brand.	Mapes F. & P. G. Co., New York.	Birdsey & Foster, Meriden.	34.00
			Mapes Branch, Hartford.	**33.00**
10678	Superphosphate.	Cumberland Bone Phosphate Co., Boston.	Kahn Bros., Yantic.	**28.00**
10418	Cereal Brand.	Mapes F. & P. G. Co., New York.	A. N. Clark, Milford.	28.00
			Mapes Branch, Hartford.	26.00
			D. B. Wilson, Waterbury.	32.00
				27.00
10534	Animal Fertilizer.	Lowell Fertilizer Co., Boston.	G. G. Avery, New London.	**33.00**
			W. D. Penfield, Cobalt.	33.00
			S. H. Bowen, Brooklyn.	33.00
			J. F. Sheridan & Bro., Manchester.	33.00
10772	Gold Brand Guano.*	E. Frank Coe Co., New York.	L. C. Grant, Talcottville.	**35.00**
10420	Special Phosphate.	Olds & Whipple, Hartford.	Manufacturer.	**34.00**
10593	Ammoniated Bone and Potash.	Wm. E. Brightman, Tiverton, R. I.	Wm. Crane, Broad Brook.	**30.00**
10347	Patent Superphosphate.	Bradley Fertilizer Co., Boston.	Wheeler & Howe, Bridgep't	33.00
			D. L. Clark, Milford.	30.00
			E. E. Scoville, Stamford.	34.00
				32.00
10521	A. A. Ammoniated Superphosphate.	H. J. Baker & Bro., New York.	Edward White, Rockville.	32.00
			W. F. Andross, E. Hartf'd.	35.00
			Saxton & Strong, Bristol.	**34.00**
10349	Hill and Drill Phosphate.	Bowker Fertilizer Co., Boston.	C. W. Michaels, Yalesville.	**32.00**
			Peck Bros., West Cheshire.	34.00
10524	King Philip Alkaline Guano.	Clark's Cove Fertilizer Co., New York.	J. M. Burk, So. Manchester	**24.00**
			H. E. Daniels, N. London	24.00
10337	High Grade Universal Fertilizer.	Packer's Union Fertilizer Co., New York.	C. O. Jelliff, Southport.	25.00
			J. H. Ray & Son, Greenwich.	28.00
				26.50
10422	Quinnipiac Phosphate.	Quinnipiac Co., Boston.	Gault Bros., Westport.	32.00
			H. S. Coe, Harwinton.	33.00
			Olds & Whipple, Hartford	35.00
				33.00
10668	Crossed Fishes Brand Fish and Potash.	Quinnipiac Fertilizer Co., Boston.	Olds & Whipple, Hartford.	**32.00**
10686	Superphosphate.	Cleveland Dryer Co., Boston.	C. E. Main, Plainfield.	**30.00**
10618	Fish, Bone, and Potash.	Read Fertilizer Co., New York.	J. M. White, Bristol,	30.00
			E. E. Pitney, Ellington.	28.00
				29.00
10533	Soluble Pacific Guano.	Pacific Guano Co., Boston.	J. A. Nichols, Danielson.	30.00
			John Bransfield, Portland.	30.00
			Saxton & Strong, Bristol.	33.00
				31.00

* See page 49.

ANALYSES.—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen. Found.	Total Nitrogen. Guaranteed.	Soluble.	Reverted.	Insoluble.	Total. Found.	Total. Guaranteed.	Available. Found.	Available. Guaranteed.	Found. As Muriate.	Found. Total.	Guaranteed.
$18.51	62.1	....	0.46	2.00	2.46	*2.0*	7.31	2.09	2.00	11.40	*11.0*	9.40	*9.0*	0.39	2.63	*1.9*
19.38	62.5	0.28	0.20	2.40	2.88	*2.5*	6.48	3.58	2.40	12.46	*10.0*	10.06	*9.0*	2.02	2.02	*2.0*
20.20	63.4	0.30	0.26	2.40	2.96	*2.5*	3.54	6.06	3.23	12.83	*12.0*	9.60	*10.0*	3.11	3.11	*2.5*
17.12	63.5	0.20	....	2.08	2.28	*2.1*	5.57	3.98	2.05	11.60	*10.0*	9.55	*8.0*	2.08	2.08	*2.0*
16.41	64.5	...	....	2.12	2.12	*1.7*	4.93	3.52	0.77	9.22	*8.0*	8.45	*6.0*	3.41	3.41	*3.0*
20.06	64.5	....	0.16	2.46	2.62	*2.5*	6.00	4.24	0.89	11.13	*10.0*	10.24	*9.0*	4.20	4.20	*4.0*
21.24	64.8	....	0.88	1.80	2.68	*2.0*	6.69	2.13	2.68	11.50	*9.0*	8.82	*8.0*	0.45	5.02	*6.0*
20.61	65.0	....	0.63	2.37	3.00	*2.5*	6.88	3.53	2.14	12.55	*10.0*	10.41	*9.0*	0.67	2.44	*2.0*
18.05	66.2	0.23	....	2.03	2.26	*2.1*	6.06	3.63	2.02	11.71	*9.0*	9.69	*8.0*	3.07	3.07	*3.0*
19.24	66.3	0.12	0.10	2.48	2.70	*2.5*	7.02	3.84	1.42	12.28	*11.0*	10.86	*9.0*	2.06	2.06	*2.0*
20.38	66.8	0.58	0.92	1.38	2.88	*2.5*	8.98	1.74	1.11	11.83	*11.0*	10.72	*10.0*	2.96	2.96	*2.0*
19.14	67.2	0.12	...	2.66	2.78	*2.3*	8.06	2.18	1.25	11.49	*12.0*	10.24	*9.0*	2.22	2.22	*2.0*
14.29	67.9	...	...	1.32	1.32	*1.0*	6.40	2.58	2.01	10.99	*9.0*	8.98	*8.0*	2.32	2.32	*2.0*
15.73	68.5	....	..	1.12	1.12	*0.8*	6.64	2.15	0.80	9.59	....	8.79	*8.0*	5.37	5.37	*5.0*
19.41	70.0	0.30	0.36	2.18	2.84	*2.5*	6.08	4.10	2.13	12.31	*10.0*	10.18	*9.0*	2.26	2.26	*3.5*
18.81	70.1	....	0.26	3.24	3.50	*3.3*	1.55	3.20	4.10	8.85	*5.0*	4.75	*3.0*	4.01	4.01	*3.0*
17.57	70.7	trace	..	2.35	2.35	*2.0*	6.00	3.78	1.54	11.32	....	9.78	*9.0*	2.29	2.29	*2.0*
16.91	71.5	.....	....	2.88	2.88	*2.5*	3.01	2.42	0.97	6.40	*5.0*	5.43	*4.0*	4.48	4.48	*4.0*
18.04	71.8	0.09	0.16	2.24	2.49	*2.3*	5.81	3.94	2.07	11.82	*10.5*	9.75	....	2.21	2.21	*2.0*

NITROGENOUS SUPERPHOSPHATES AND GUANOS, SAMPLED BY THE STATION.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10424	Ammoniated Bone Phosphate.	National Fertilizer Co., Bridgeport.	G. A. & H. B. Williams, East Hartford.	$30.00
			Ansonia Flour and Grain Co., Ansonia.	32.00
			Manufacturer.	28.00
				30.00
10401	Square Brand Bone and Potash.	Bowker Fertilizer Co., Boston.	C. T. Leonard, Norwalk.	25.00
			E. W. S. Pickett, Fairfield	28.00
			Bowker's Branch, Hartf'd.	27.00
				26.50
10528	Guano for All Crops.	Standard Fertilizer Co., Boston.	F. J. Newton, Branford.	26.00
			W. E. Truesdell, Burnside.	24.00
				25 00
10599	Original Coe's Superphosphate.	Bradley Fertilizer Co., Boston.	Wilson & Burr, Middletown.	**30.00**
10627	Dissolved Bone and Potash.	Lowell Fertilizer Co., Boston.	F. A. Chamberlain, Unionville.	.....
			N. N. King, Thomps'nv'l.	28.00
			J. W. Beard, Plainville.	30.00
			G. M. Bradley, Danbury.	31.00
				29 00
10691	Buffalo Fertilizer.	Milsom Rend. and Fertilizer Co., East Buffalo, N. Y.	I. J. Scoville, Plainville.	**26.50**
10654	Original Bay State.	H. F. Tucker Co., Boston	W. R. Amadon, Staffordville.	**30.00**
10640	Defiance Phosphate.	Clark's Cove Fertilizer Co., New York.	H. E. Daniels, New London.	**22 00**
10596	Eclipse Phosphate.	Bradley Fertilizer Co , Boston.	C. F. Tallard & Son, Broad Brook.	29.00
			W. W. Sheldon, So. Woodstock	27.00
				28.00
10526	Imperial Bone Superphosphate for All Crops.	H. F. Tucker Co., Boston.	F H. Rolf, Guilford.	**28.00**
			E. A Buck & Co., Willimantic.	28.00
10692	Buffalo Guano.	Milsom Rend. and Fertilizer Co., East Buffalo, N. Y.	Chas. H. Davis, Guilford	**25.00**
10523	B. D. Sea Fowl Guano.	Bradley Fertilizer Co., Boston.	F. S. Bidwell, Windsor Locks.	**30.00**
			W. W. Cooper, Suffield.	30.00
10492	New Rival Ammoniated Superphosphate.	Crocker Fertilizer Co., Buffalo, N. Y.	Clark & Bradley, North Westchester.	24.00
			W. Gildersleeve, Gildersleeve.	35.00
				28.00
10467	Sure Crop Phosphate.	Bowker Fertilizer Co., Boston.	Hubbell & Bradley, Saugatuck.	28.00
			C. T. Leonard, Norwalk.	24.00
			H. E. Daniels, N. London.	**26.00**
10591	Brightman's Fish and Potash.	Wm. E. Brightman, Tiverton, R. I.	Wm. Crane, Broad Brook	**28.00**
10350	Bowker's Ammoniated Dissolved Bone, or Farm and Garden Phosphate.	Bowker Fertilizer Co., Boston.	E. B. Clark Co., Milford.	26.00
			C. T Leonard, Norwalk.	38.00
			Linsley & Lightbourn, New Haven.	35.00
				30.00

ANALYSES—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$17.44	72.0	....	....	2.22	2.22	*1.6*	2.08	8.28	1.45	11.81	*9.0*	10.36	*7.0*	2.53	2.53	*2.0*
15.37	72.4	....	....	1.95	1.95	*1.5*	2.82	4.72	4.23	11.77	*12.0*	7.54	*6.0*	2.24	2.24	*2.0*
14.49	72.5	....	....	1.40	1.40	*1.0*	7.12	2.15	1.49	10.76	*10.0*	9.27	*8.0*	2.16	2.16	*2.0*
17.37	72.7	....	....	2.32	2.32	*2.1*	5.98	4.21	1.87	12.06	*10.0*	10.19	*8.0*	1.61	1.61	*1.0*
16.75	73.1	....	....	2.05	2.05	*1.7*	7.39	2.45	1.35	11.19	*10.0*	9.84	*9.0*	2.19	2.19	*1.0*
15.28	73.4	....	....	2.10	2.10	*1.9*	5.89	2.02	2.66	10.57	*9.0*	7.91	*8.0*	1.67	1.67	*1.5*
17.25	73.9	0.20	....	2.02	2.22	*2.1*	6.10	3.74	1.98	11.82	*11.0*	9.84	*9.0*	2.12	2.12	*2.0*
12.54	75.4	....	....	1.04	1.04	*0.8*	6.27	3.01	1.45	10.73	*9.0*	9.28	*7.0*	1.17	1.17	*1.0*
15.82	77.0	0.14	....	1.58	1.72	*1.0*	6.58	3.70	1.80	12.08	*12.0*	10.28	*10.0*	1.69	1.69	*1.5*
15.76	77.7	....	...	1.86	1.86	*1.3*	5.55	3.61	1.84	11.00	*11.0*	9.16	*9.0*	2.26	2.26	*1.9*
13.98	78.8	...	....	0.85	0.85	*0.8*	6.26	2.54	0.78	9.58	*9.0*	8.80	*8.0*	4.27	4.27	*4.0*
16.42	82.7	....	....	2.09	2.09	*2.0*	6.59	3.22	2.10	11.91	*10.0*	9.81	*8.0*	1.43	1.43	*1.5*
15.24	83.7	....	....	1.52	1.52	*1.2*	7.78	2.87	0.72	11.37	....	10.65	*10.0*	1.64	1.64	*1.6*
14.15	83.7	0.14	....	1.02	1.16	*0.8*	7.47	3.24	1.92	12.63	*10.0*	10.71	*8.0*	1.00	1.00	*1.0*
15.15	84.8	....	0.23	2.32	2.55	*2.1*	2.34	3.68	2.35	8.37	*7.5*	6.02	*6.0*	2.38	2.38	*2.0*
16.17	85.5	0.14	....	1.78	1.92	*1.5*	6.50	2.77	2.29	11.56	*10.0*	9.27	*8.0*	2.17	2.17	*2.0*

NITROGENOUS SUPERPHOSPHATES AND GUANOS, SAMPLED BY THE STATION.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10696	Cereal Brand.	Frederick Ludlam, New York.	J. M. Beckwith, Chesterfield.	$26.00
10687	Fertilizer for All Crops.	Cleveland Dryer Co , Boston.	C. E. Main, Plainfield.	27.00
10671	Triumph.	Niagara Fertilizer Co., Buffalo, N. Y.	C. A. Ahlquist, Portland.	35.00
10652	Standard Fertilizer.	Standard Fertilizer Co., Boston.	W. E. Truesdell & Co., Burnside.	32.00
10471	General Crop Phosphate.	Crocker Fertilizer Co., Buffalo, N. Y.	Clark & Bradley, North Westchester.	20.00
			Henry Davis, Durham Center.	20.00
			The Meeker Coal Co , Norwalk.	25.00
				22.00
10637	Royal Bone Phosphate.	Williams & Clark, New York.	D. S. Buell, Madison.	27.00
			S. E. Brown, Collinsville.	28.00
				27.50
10662	Leader Guano.	Read Fertilizer Co., New York.	J. R. Babcock, Mystic.	24.50
10530	Climax Phosphate.	Quinnipiac Co., Boston.	Bailey & Markham, Cobalt.	35.00
			C. A. Young, Danielson.	28.00
			W. C. Pease, Somers.	29.00
			O. S. Olmsted, Melrose.	26.00
10619	Standard Superphosphate.	Read Fertilizer Co., New York.	J. W. Palmer, Stamford.	32.00
			J. R. Babcock, Mystic.	27.00
			J. N. Clark, Columbia.	28.00
				29.00
10598	Niagara Phosphate.	Bradley Fertilizer Co., Boston.	Sanford & Hawley, Unionville.	25.00
			Wilson & Burr, Middletown.	25.00
			P. Schwartz, Chesterfield.	25.00
			H. S. Harvey, Windham Center.	21.00
10669	Nobsque Guano.	Pacific Guano Co., Boston	James A. Nichols, Danielson.	28.00
10609	General Fertilizer.	Great Eastern Fertilizer Co., Rutland, Vt.	Silas Finch, Greenwich.	29.00
			Elmer Keeler, Danbury.	30.00
				29.50
10688	Pioneer.	Cleveland Dryer Co., Boston.	C. E. Main, Plainfield.	24.00
10680	Hawkeye Fertilizer.	Cumberland Bone Phosphate Co., Boston.	Geo. C. Dean, Plainfield.	27.00
10693	Erie King.	Milsom Rend. and Fertilizer Co., East Buffalo, N. Y.	D. E. Doolittle, West Cheshire.	24.00
10685	Gold Brand Excelsior Guano.*	E. Frank Coe Co., New York.	Edgar Brewer & Son, Hockanum.	.....
10445	Fertilizer.	Connecticut Reduction Co., Bridgeport.	Manufacturer.	18.00
			W. H. Tinkham, Milford.	16.00
			D. B. Wilson, Waterbury.	15.00
10315	Fertilizer.	L. Sanderson, New Haven.	F. S. Hopson, Stratford.	.....

* See page 49.

ANALYSES—*Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen. Found.	Total Nitrogen. Guaranteed.	Soluble.	Reverted.	Insoluble.	Total. Found.	Total. Guaranteed.	Available. Found.	Available. Guaranteed.	Found. As Muriate.	Found. Total.	Guaranteed.
$13.98	86.0	0.20	....	0.98	1.18	*0.8*	7.25	3.31	1.93	12.49	*10.0*	10.56	....	0.91	0.91	*1.0*
14.35	88.2	.....	.....	1.29	1.29	*1.0*	7.30	1.99	1.37	10.66	*9.0*	9.29	*8.0*	2.39	2.39	*2.0*
18.57	88.5	.....	.....	2.88	2.88	*2.5*	6.40	2.20	2.77	11.37	...	8.60	*8.0*	2.21	2.21	*2.2*
16.89	89.5	0.26	....	1.92	2.18	*2.0*	5.79	3.70	2.11	11.60	*10.0*	9.49	*8.0*	2.14	2.14	*2.0*
11.43	92.5	....	...	1.26	1.26	*0.8*	4.09	3.65	1.20	8.94	....	7.74	*7.0*	0.96	0.96	*1.0*
14.21	93.5	.....	.....	1.32	1.32	*1.0*	5.39	3.57	1.95	10.91	*8.0*	8.96	*7.0*	2.37	2.37	*2.0*
12.65	93.7	.....	.....	1.34	1.34	*0.8*	5.11	2.58	0.82	8.51	*8.0*	7.69	*7.0*	2.25	2.25	*2.0*
14.29	95.9	.....	.....	1.27	1.27	*1.0*	7.05	2.20	1.62	10.87	*9.0*	9.25	*8.0*	2.32	2.32	*2.0*
14.57	99.0	.....	.....	1.15	1.15	*0.8*	6.29	2.32	0.92	9.53	*9.0*	8.61	*8.0*	4.07	4.07	*4.0*
12.32	102.9	.....	.....	1.25	1.25	*0.8*	4.19	3.75	2.19	10.13	*8.0*	7.94	*7.0*	1.38	1.38	*1.0*
13.57	106.3	.....	.....	1.18	1.18	*1.2*	6.69	2.11	1.33	10.13	*9.0*	8.80	*8.0*	2.39	2.39	*2.0*
14.29	106.4	.....	.....	1.10	1.10	*0.8*	6.42	1.92	0.79	9.13	....	8.34	*8.0*	4.20	4.20	*4.0*
11.42	110.2	.....	.....	0.98	0.98	*0.8*	3.15	5.01	2.14	10.30	*9.0*	8.16	*7.0*	1.14	1.14	*1.0*
12.39	117.9	.....	.....	1.17	1.17	*0.8*	4.67	3.62	2.52	10.81	*9.0*	8.29	*7.0*	1.18	1.18	*1.0*
10.70	124.3	....	...	0.90	0.90	*0.8*	5.22	2.19	0.69	8.10	*9.0*	7.41	*7.0*	1.71	1.71	*2.0*
21.03	.....	....	0.85	1.81	2.66	*2.0*	6.80	2.22	2.48	11.50	*9.0*	9.02	*8.0*	0.27	4.73	*6.0*
.....	.....	....	....	2.70	2.70	*3.5*	none	2.73	1.44	4.17	...	2.73	*3.5*	0.40	0.40	*3.1*
27.57	.....	0.77	....	3.09	3.86	*4.0*	5.30	4.39	1.41	11.10	....	9.69	*9.0*	9.50	9.50	*8.0*

2 and 3. Sampled by Manufacturers and Purchasers.

In the table below is given one analysis of a nitrogenous superphosphate, sampled by a manufacturer, and nine analyses of samples sent to the Station by purchasers.

10462. Fish, Bone, and Potash. Mr. E. R. Kelsey wrote that the sample represents goods made early in the year. The manufacturer afterwards had his stock of potash salts analyzed at the Station, and, finding the percentage of potash lower than represented in the German analysis, on which he had based his formula, worked over his stock, adding more potash to it.

10245 and 10217. Made by the Connecticut Reduction Co. or Bridgeport Utilization Co., represent garbage fertilizers to which reference has been already made, page 49.

The solubility of the nitrogen in pepsin solution, a reagent which, in a general way, measures the availability of the nitrogen, was found to be very low, 17.0 and 18.1 per cent., respectively.

It is, therefore, probable that the nitrogen of the material is of very inferior value as plant food. Consequently, no valua-

NITROGENOUS SUPERPHOSPHATES, SAMPLED BY MANUFACTURERS (☞)

Station No.	Name of Brand.	Manufacturer.	Sampled by	Valuation per ton.
10713	Bone, Blood, and Potash.	Armour Fertilizer Co., Chicago.	Manufacturer.	$28.98
10289	Bowker's Fairfield Formula.	Bowker Fertilizer Co., Boston.	Simeon Pease, Greenfield Hill.	27.92
10538	Red Brand Excelsior Guano.	E. Frank Coe Co., New York.	Sidney B. Smith, East Haven.	24.78
10462	Fish, Bone, and Potash.	E. R. Kelsey, Short Beach.	E. C. Warner, Fair Haven.	18.98
10369	Conn. Valley Orchard Co.'s Fertilizer.	Quinnipiac Co., Boston.	Earl Cooley, Berlin.	23.85
10363	Scientific Economy Fertilizer.	The Scientific Fertilizer Co., Pittsburgh, Pa.	R. K. Woodward, Amenia Union, N. Y.	17.81
10245	Fertilizer.	Connecticut Reduction Co., Bridgeport.	S. E. Frisbie, Milford.	.....
10217	Fertilizer.	Bridgeport Utilization Co., Bridgeport.	Joseph Lee, Southport.	.... .
10366	Berkshire Complete Fertilizer.	Berkshire Mills Co., Bridgeport.	M. A. Fitzgerald, Stratford.	.... .
10365	Berkshire Complete Fertilizer.	Berkshire Mills Co., Bridgeport.	M. A. Fitzgerald, Stratford.	.... .

tion is assigned to these goods, and the facts regarding them were published promptly in Bulletin 127.

Nitrogen solubility was also determined in 10289, Fairfield formula, made by the Bowker Fertilizer Co., and was found satisfactory, 74.2 per cent.

The last two samples, 10360 and 10366, were sent to ascertain whether the percentage of nitrogen was in both cases as guaranteed.

Special Manures.

Here are included such mixed fertilizers, chiefly nitrogenous superphosphates, as are claimed by their manufacturers to be specially adapted to the needs of particular crops.

1. *Samples drawn by Station Agents.*

In the tables on pages 66 to 79 are given analyses of one hundred and eleven samples drawn by the Station agents and representing one hundred and seven brands.

and Purchasers. Analyses and Valuations.

Nitrogen.					Phosphoric Acid.							Potash.		
			Total Nitrogen.					Total.		Available.		Found.		
Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Found.	Guaranteed.	Soluble.	Reverted.	Insoluble.	Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	Guaranteed.
0.77	....	3.91	4.68	*4.1*	7.04	2.50	1.40	10.94	*10.0*	9.54	*8.0*	0.26	7.17	*7.0*
0.90	0.10	3.10	4.10	*4.0*	5.65	2.79	.80	9.24	.....	8.44	*8.0*	10.56	10.56	*8.0*
....	1.00	2.59	3.59	*3.5*	7.01	1.35	1.43	9.79	*10.0*	8.36	*9.0*	.61	6.86	*6.0*
....	0.88	2.81	3.69	*3.3*	2.54	2.99	.69	6.22	.....	5.53	*4.0*	.49	3.76	....
1.56	....	2.63	4.19	*4.1*	6.70	2.97	2 32	11.99	.....	9.67	*9.0*	3.64	3.64	*3.0*
.....	.....	2.44	2.44	*2.1*	4.18	4.06	1.20	9.44	*9.0*	8.24	*7.5*	.....	3.49	*4.0*
.....	.....	2.65	2.65	*2.6*	None.	2.53	1.23	3.76	.....	2.53	*4.5*	0.37	0.37	*3.1*
.....	.....	....	3.35	*2.6*	None.	2.00	1.65	3.65	.....	2.00	*4 5*	.....	0.34	*3.1*
.....	.....	....	3.10	*2.5*	.....	....	....	.....	.....	.....	.....	....	.....	....
.....	.....	....	3.44	*3.3*	.....	.....	.....	.....	.....	.....	.....	....	.....	...

GUARANTEES.

Of the one hundred and eleven samples analyzed, thirty-three do not fulfill the manufacturer's minimum guarantee in respect of one ingredient, and six are each deficient in respect of two ingredients. The causes of these deficiencies have in part been mentioned on page 47.

Thirteen were deficient in nitrogen, twenty-two in potash, and ten in phosphoric acid. In eight of the ten cases, however, the available phosphoric acid was as guaranteed, the deficiency being only in the insoluble part of the phosphoric acid.

COST AND VALUATION.

The average cost per ton of the one hundred and eleven samples examined was $33.11, the valuation $21.72, and the percentage difference 52.4.

In 1897 the corresponding figures were: Average cost, $34.34; average valuation, $24.28; percentage difference, 41.4.

Analyses requiring Special Notice.

No. **10585,** pp. 70 and 71. Stockbridge Top Dressing, made by the Bowker Fertilizer Co., Boston, Mass. The manufacturer called attention to the fact that the nitrogen found, 3.93 per cent., was nearly one per cent. under the guarantee, and, in view of the discrepancy, asked that another sample be drawn. This was done, and the analysis, No. **10728,** pp. 70 and 71, made on another sample shows 5.67 per cent. of nitrogen, but only 4.36 per cent. of potash, being less than the guarantee, 6.0 per cent., and less than was found in the first sample, 6.47 per cent. The reason for these variations does not appear.

10664, pp. 76 and 77. Vegetable and Vine Manure. Made by the Read Fertilizer Co., N. Y. city. The manufacturer stated that as the percentage of potash, 6.90, was considerably under the guarantee, 8.0 per cent., he believed that the sample did not fairly represent the goods, and asked that another sample be drawn and analyzed. This was done, and the results are given in No. **10752,** pages 74 and 75. The percentage of potash found in this sample was much nearer, though not up to the maker's guarantee.

A similar request was made regarding No. **10694,** pp. 78 and 79. Wheat, Oats, and Barley Phosphate. Made by the Milsom Rendering and Fertilizer Co., East Buffalo, N. Y. Another analysis, **10773,** made on a different sample, gave essentially the same percentage of potash as the first analysis.

10417, pp. 78 and 79. Wheat and Corn Producer. Made by the Niagara Fertilizer Works, Buffalo, N. Y. The manufacturer stated that this analysis did not fairly represent the general quality of this brand, which contained more potash than was found in our analysis.

A second analysis, made on another sample, **10730,** showed composition very similar to the first.

10402. Wilson's Corn and Grain Fertilizer, pp. 68 and 69. Made for D. B. Wilson & Co., Waterbury, by the Bowker Fertilizer Co., Boston. But a small quantity of this fertilizer was shipped into the state and was subsequently withdrawn.

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10710	Seeding Down Manure.	Mapes F. & P. G. Co., N. Y.	Manufacturer.	$35.00
10405	High Grade Grass and Grain Fertilizer.	Rogers Mfg. Co., Rockfall.	Manufacturer.	37.00
10736	High Grade Grass and Grain.	Rogers Mfg. Co., Rockfall.	Manufacturer.	37.00
10403	Hubbard's Grass and Grain Fertilizer.	Rogers & Hubbard Co., Middletown.	H. W. Andrews, Wallingford.	38.00
			City Coal & Wood Co., New Britain.	37.00
				37.50
10701	Tobacco Grower.	L. B. Darling Fertilizer Co., Pawtucket, R. I.	J. B. Pease, Melrose.	38.00
10647	Oats and Top Dressing.	Rogers Mfg. Co., Rockfall.	Manufacturer	42.00
10656	Americus Fine Wrapper Tobacco Grower.	Williams & Clark, New York.	J. Barnard, Simsbury.	40.00
10331	Hubbard's Soluble Tobacco Manure.	Rogers & Hubbard Co., Middletown.	H. W. Andrews, Wallingford.	42.00
			C. L. Luce, New Britain.	40.00
10332	Armour's Grain Grower.	Armour Fertilizer Works, Chicago.	C. J. Benham, New Haven.	25.00
			Adams & Canfield, Winnipauk.	21.00
				23.00
10400	Hubbard's Oats and Top Dressing.	Rogers & Hubbard Co., Middletown.	City Coal & Wood Co., New Britain.	48.00
			H. W. Andrews, Wallingford.	49.00
			W. C. Bulkley, Forestville.	47.00
10649	Special Tobacco Manure.	Russia Cement Co., Gloucester, Mass.	J. B. Parker, Poquonock.	43.00
10525	Tobacco Ash Elements.	Bowker Fertilizer Co., Boston.	H. K. Brainard, Thompsonville	32.00
			G. M. Risley, Windsor.	30.00
			Bowker's Branch, Hartford.	32.00
10586	Tobacco Ash Fertilizer.	Bowker Fertilizer Co., Boston.	G. M. Risley, Windsor.	40.00
			Bowker's Branch, Hartford.	42.00
				41.00
10241	Preston's Potato Phosphate.	Preston Fertilizer Co., Greenpoint, L. I.	O. G. Beard,* Shelton.	31.00
10486	Essex Complete Manure for Corn, Grain, and Grass.	Russia Cement Co., Gloucester, Mass.	T. Anderson & Co., Cromwell.	38.00
			C. N. Jones, Wallingford.	38.00
			E. N. Pierce & Co., Plainville.	38.00
10485	Complete Manure for Potatoes, Roots, and Vegetables.	Russia Cement Co., Gloucester, Mass.	R. M. Burnham, East Windsor Hill.	39.00
			L. A. Carrier, Berlin.	40.00
			C. N. Jones, Wallingford.	38.00
10631	Hubbard's Potato Phosphate.	Rogers & Hubbard Co., Middletown.	H. W. Andrews, Wallingford.	30.00
			J. P. Barstow, Norwich.	30.00
			Manufacturer.	30.00
10625	Tobacco Manure, Wrapper Brand.	Mapes F. & P. G. Co, New York.	Mapes Branch, Hartford.	44.00
			D. W. Barnes, Windsor.	46.00

*Consumer, not a dealer.

Analyses and Valuations.

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$30.48	14.8	1.69	....	1.09	2.78	*2.5*	....	....	....	17.65	*18.0*	....	....	11.09	11.09	*10.0*
31.56	17.2	0.36	0.13	2.38	2.87	*3.0*	....	....	....	15.22	*16.0*	....	....	14.64	14.64	*12.5*
31.14	18.8	0.06	0.10	2.56	2.72	*3.0*	....	....	....	17.45	*16.0*	....	....	13.14	13.14	*12.5*
30.91	21.3	....	....	3.04	3.04	*2.5*	....	....	....	18.37	*16.5*	....	....	11.96	11.96	*12.5*
31.14	22.0	....	2.23	2.79	5.02	*4.9*	3.82	3.74	1.08	8.64	*8.0*	7.56	*7.0*	0.33	10.28	*10.0*
33.31	26.1	4.76	0.14	1.72	6.62	*6.3*	1.87	6.08	0.66	8.61	*9.0*	7.95	....	10.49	10.49	*7.5*
31.58	26.7	0.86	1.83	2.89	5.58	*5.8*	4.35	1.52	1.68	7.55	*6.0*	5.87	*5.0*	0.76	10.43	*10.0*
31.52	26.9	1.31	....	3.54	4.85	*5.0*	1.76	7.65	1.20	10.61	*10.0*	9.41	*7.0*	0.99	10.17	*10.0*
17.97	27.9	....	....	2.36	2.36	*1.6*	4.34	5.16	3.18	12.68	*10.0*	9.50	*8.0*	1.33	2.25	*2.0*
37.52	27.9	7.73	....	1.55	9.28	*8.8*	....	....	....	8.47	*7.9*	....	....	8.48	8.48	*8.4*
33.29	29.2	....	1.37	3.68	5.05	*4.5*	4.70	3.12	1.12	8.94	*8.0*	7.82	....	0.67	12.07	*12.0*
24.73	29.4	....	....	....	....	....	0.08	8.43	3.71	12.22	....	8.51	*6.0*	1.26	16.63	*15.0*
31.61	29.7	2.96	....	0.55	3.51	*3.0*	....	8.67	4.20	12.87	....	8.67	*5.0*	1.36	13.95	*13.0*
23.73	30.6	0.34	..	1.81	2.15	*1.6*	4.50	4.65	1.99	11.14	....	9.15	*7.0*	9.62	10.66	*10.0*
29.05	30.8	0.91	....	3.38	4.29	*3.7*	4.69	4.86	1.85	11.40	*9.5*	9.55	....	9.85	9.85	*9.5*
29.77	31.00	0.24	0.72	3.34	4.30	*3.7*	4.94	4.54	1.69	11.17	*9.0*	9.48	....	0.80	9.14	*8.5*
22.75	31.9	0.68	....	1.96	2.64	*2.0*	7.70	3.90	2.08	13.68	*10.0*	11.60	*9.0*	5.42	5.42	*5.0*
33.36	31.9	3.07	1.67	1.72	6.46	*6.2*	0.26	5.06	0.42	5.74	*4.5*	5.32	....	0.81	11.55	*10.5*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10567	Potato, Onion, and Tobacco Manure.	Wilcox Fertilizer Works, Mystic.	W. A. Howard, Woodstock.	$34.00
			F. A. Rathbun, Hebron.	37.00
			J. W. Dennison, Mystic.	31.00
			Manufacturer.	35.00
			C. M. Smith, E. Hartford.	35.00
10624	Tobacco Ash Constituents.	Mapes F. & P. G. Co., New York.	Mapes Branch, Hartford.	30.00
			F. S. Bidwell, Windsor Locks.	31.00
			W. W. Cooper, Suffield.	30.00
10611	Potato and Root Crop Manure.	L. B. Darling Fertilizer Co., Pawtucket, R. I.	A. I. Kinney, Terryville.	34.00
			Hotchkiss & Templeton, Waterbury.	36.00
				35.00
10560	Complete for Potatoes and Vegetables.	Rogers Mfg. Co., Rockfall.	Manufacturer.	30.00
			A. J. Palmer, Branford.	28.00
10610	Potato Manure.	Lister's Agricultural Chemical Works, Newark, N. J.	Strong & Tanner, Winsted.	35.00
			Daniels Bros., Middletown.	30.00
			A. N. Clark, Milford.	34.00
				33 00
10329	Hubbard's Soluble Potato Manure.	Rogers & Hubbard Co., Middletown.	H. W. Andrews, Wallingford.	38.00
			City Coal & Wood Co., New Britain.	37.00
			C. L. Luce, New Britain.	36.00
			J. F. Close, Round Hill.	38.00
10632	High Grade Soluble Tobacco Manure.	Rogers Mfg. Co., Rockfall.	Manufacturer.	42.00
			W. F. Andross, East Hartford.	40.00
10338	Swift's Lowell Potato Phosphate.	Lowell Fertilizer Co., Boston.	J. C. Lincoln, Berlin.	30.00
			C. W. Lines, New Britain.	32.00
				31.00
10580	Complete Potato Manure.	H. J. Baker & Bro., New York.	Edward White, Rockville.	38.00
			J. W. Ives, Danbury.	35.00
				36 50
10633	High Grade Soluble Potato and General Crops.	Rogers Mfg. Co., Rockfall.	Manufacturer.	38.00
			F. S. Bidwell, Windsor Locks.	39.00
10402	*Wilson's Corn and Grain Fertilizer.	Bowker Fertilizer Co., Boston, Mass.	D. B. Wilson, Waterbury.	25.00
10595	High Grade Tobacco Manure.	Bradley Fertilizer Co., Boston.	H. C. Aborn, Ellington.	44.00
			D. T. Dyer, Collinsville.	46.00
				45.00
10351	Grass and Grain Spring Top Dressing.	Mapes F. & P. G. Co., New York.	Birdsey & Foster, Meriden.	39.00
			Mapes Branch, Hartford.	38.00
10469	Stockbridge Potato and Vegetable.	Bowker Fertilizer Co , Boston.	E. B. Clark & Co., Milford.	36.00
10330	Economical Potato Manure.	Mapes F. & P. G. Co., New York.	Birdsey & Foster, Meriden.	34.00
			Southington Lumber & Feed Co., Southington.	33.00
				33.50
10634	Special Potato Fertilizer.	H. F. Tucker Co., Boston.	E. A. Buck, Willimantic.	31.00
			Alfred Sneider, Rockville.	27.00
				29.00
10335	Potato Manure.	Mapes F. & P. G. Co., New York.	Birdsey & Foster, Meriden.	38.00
			A. N. Clark, Milford.	38.00

*See page 65.

ANALYSES AND VALUATIONS.— *Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$25.55	33.1	0.81	....	3.16	3.97	*3.3*	3.98	4.17	1.51	9.66	*8.0*	8.15	*7.0*	0.07	7.08	*6.0*
22.29	34.6	....	....	0.64	0.64	*0.5*	....	4.43	1.89	6.32	*5.7*	4.43	....	0.92	16.34	*15.0*
25.91	35.1	0.63	0.23	3.32	4.18	*2.8*	3.76	6.22	1.18	11.16	*10.0*	9.98	*9.0*	5.44	6.32	*7.0*
22.09	35.8	0.90	....	1.56	2.46	*2.3*	6.30	6.04	1.86	14.20	*10.0*	12.34	....	4.87	4.87	*5.0*
24.22	36.2	....	1.24	2.32	3.56	*3.7*	6.72	1.88	0.96	9.56	*8.5*	8.60	*7.5*	7.43	7.43	*7.0*
27.14	36.3	1.34	....	3.67	5.01	*5.0*	1.78	6.66	1.54	9.98	*10.0*	8.44	*7.0*	1.00	5.98	*5.0*
30.75	36.6	1.42	....	3.02	4.44	*5.0*	1.76	6.74	1.13	9.63	*8.0*	8.50	....	0.77	11.29	*11.0*
22.64	36.9	....	....	2.89	2.89	*2.5*	6.30	2.66	0.35	9.31	*9.0*	8.96	*8.0*	0.14	6.63	*6.0*
26.56	37.4	0.52	1.83	1.44	3.79	*3.3*	5.92	.96	0.74	7.62	*6.8*	6.88	*5.7*	9.98	11.16	*10.0*
27.34	39.0	0.88	....	2.63	3.51	*3.5*	2.19	7.11	2.09	11.39	*9.0*	9.30	....	0.89	9.32	*8.8*
16.71	40.9	0.18	....	1.66	1.84	*1.5*	6.50	2.79	1.94	11.23	*9.0*	9.29	*8.0*	3.21	3.21	*3.0*
31.80	41.5	....	4.05	1.82	5.87	*5.8*	2.93	3.03	1.51	7.47	*6.0*	5.96	*5.0*	1.36	9.90	*10.0*
26.73	42.2	1.23	1.47	2.62	5.32	*4.9*	2.48	3.84	0.70	7.02	*6.0*	6.32	*5.0*	7.64	7.64	*7.0*
25.24	42.6	1.50	....	2.13	3.63	*3.2*	3.38	3.42	1.98	8.78	*7.0*	6.80	*5.0*	10.36	10.36	*10.0*
23.48	42.7	1.16	0.28	2.14	3.58	*3.3*	2.37	4.48	0.99	7.84	*6.0*	6.85	*4.0*	2.09	7.89	*8.0*
20.22	43.4	0.28	....	2.48	2.76	*2.5*	3.54	3.55	1.98	9.07	*10.0*	7.09	*8.0*	6.74	6.74	*6.0*
26.32	44.4	0.90	2.78	0.32	4.00	*3.7*	3.73	4.93	1.29	9.95	*8.0*	8.66	*8.0*	0.80	7.60	*6.0*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10491	N. E Potato and Tobacco Grower.	Crocker Fertilizer Co, Buffalo, N. Y.	Clark & Bradley, North Westchester.	$30.00
			Walter Gildersleeve, Gildersleeve.	40.00
			The Meeker Coal Co., Norwalk.	34.00
				32.00
10698	Tobacco Manure.	Lowell Fertilizer Co., Boston.	J. D. Beasley, Ellington.	40 00
10592	Special Tobacco and Market Garden.	Wm. E. Brightman, Tiverton, R. I.	William Crane, Broad Brook.	35.00
10648	Complete Corn Manure.	Rogers Mfg. Co., Rockfall.	Manufacturer.	35.00
10623	Tobacco Starter.	Mapes F. & P. G. Co., New York.	Mapes Branch, Hartford.	33.00
			D. W. Barnes, Windsor.	35.00
10607	Fruit and Vine.	Lowell Fertilizer Co., Boston.	W. D. Penfield, Cobalt.	37.00
			N. N. King, Thompsonville.	35.00
				36.00
10728	*Stockbridge Top Dressing.	Bowker Fertilizer Co., Boston.	C. W. Michaels & Co., Yalesville.	38.00
10348	Complete Manure for Potatoes and Vegetables.	Bradley Fertilizer Co., Boston.	D. L. Clark, Milford.	36.00
			Lockwood & Hotchkiss, Ansonia.	35.00
				35.50
10475	Fruit and Vine Manure.	Mapes F. & P. G. Co., New York.	Mapes Branch, Hartford.	37.00
			J. H. Barker, Branford.	39.00
			J. P. Barstow, Norwich.	40.00
10352	Corn Manure.	Mapes F. & P. G. Co., New York.	A. N. Clark, Milford.	36.00
			Mapes Branch, Hartford.	34.00
10639	Potato and Corn Guano.	Preston Fertilizer Co., Greenpoint, L. I.	Bronson Bros. & Co., Winchester Center.	30.00
			T. B. Wickwire, Berlin.	30.00
10566	Potato Manure.	Wilcox Fertilizer Works, Mystic.	Manufacturer.	30.00
			F. A. Rathbun, Hebron.	32.00
			W. A. Howard, Woodstock.	29.00
10600	Stockbridge Tobacco Manure.	Bowker Fertilizer Co., Boston.	H. K. Brainard, Thompsonville.	48.00
10585	*Stockbridge Top Dressing.	Bowker Fertilizer Co., Boston.	W. O. Goodsell, Bristol.	37.00
10661	Potato and Onion Fertilizer.	Preston Fertilizer Co., Greenpoint, L. I.	T. B. Wickwire, Berlin.	34.00
10466	Potato Fertilizer.	Cumberland Bone Phosphate Co., Boston.	Kahn Bros., Yantic.	28.00
			A. J. Palmer, Branford.	27.00
				27.50
10666	Onion Manure.	Quinnipiac Fertilizer Co., Boston.	W. C. Pease, Somers.	36.00
10487	Essex Potato Fertilizer.	Russia Cement Co., Gloucester, Mass.	C. N. Jones, Wallingford.	33.00
			L. A. Carrier, Berlin.	34.00
			Southington Lumber & Feed Co., Southington.	32.00
			J. M. White, Bristol.	35.00
			F. L. Hitchcock, Watertown.	35.00
			T. Anderson & Co., Cromwell.	35.00

* See page 64.

Analyses and Valuations.— *Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$21.99	45.5	....	....	3.50	3.50	*3.3*	3.71	3.27	2.14	9.12	....	6.98	*6.0*	0.53	5.45	*5.4*
27.42	45.9	....	0.18	4.66	4.84	*4.9*	4.82	1.32	0.37	6.51	....	6.14	*6.0*	0.69	8.42	*8.0*
23.97	46.0	0.84	....	2.67	3.51	*3.3*	3.08	6.13	1.87	11.08	*9.0*	9.21	*8.0*	6.93	6.93	*7.0*
23.86	46.7	1.45	....	2.01	3.46	*3.6*	3.07	5.54	2.53	11.14	*8.0*	8.61	....	7.36	7.36	*7.0*
22.37	47.5	1.54	0.48	1.18	3.20	*2.5*	4.35	7.40	1.57	13.32	*12.0*	11.75	*8.0*	0.69	3.36	*2.5*
24.24	48.5	....	....	3.89	3.89	*3.3*	5.73	1.62	0.76	8.11	*9.0*	7.35	*8.0*	0.88	6.72	*6.0*
25.37	49.8	2.84	....	2.83	5.67	*4.8*	2.34	4.18	2.06	8.58	*6.0*	6.52	*4.0*	3.73	4.36	*6.0*
23.68	49.9	0.78	0.44	2.08	3.30	*3.3*	6.27	3.01	1.12	10.40	*9.0*	9.28	*8.0*	7.17	7.17	*7.0*
24.68	49.9	0.50	....	1.87	2.37	*1.7*	2.32	4.16	1.52	8.00	*7.0*	6.48	*5.0*	1.09	12.27	*10.0*
22.65	50.1	0.18	0.84	1.86	2.88	*2.5*	5.52	4.89	0.68	11.09	*10.0*	10.41	*8.0*	6.43	6.43	*6.0*
19.97	50.2	0.26	....	1.02	1.28	*1.6*	6.86	5.81	1.39	14.06	....	12.67	*8.0*	5.94	5.94	*3.0*
19.92	50.6	....	0.44	2.34	2.78	*2.0*	2.26	5.34	3.38	10.98	*8.0*	7.60	*7.0*	4.81	5.21	*4.0*
31.82	50.8	3.05	....	2.81	5.86	*5.8*	....	4.83	3.98	8.81	*6.0*	4.83	*4.0*	0.60	10.66	*10.0*
24.52	50.9	2.35	....	1.58	3.93	*4.8*	4.37	4.14	1.83	10.34	*6.0*	8.51	*4.0*	3.00	6.47	*6.0*
22.44	51.5	0.20	....	2.71	2.91	*2.3*	1.63	6.96	4.56	13.15	....	8.59	*6.0*	6.43	6.43	*6.0*
18.05	52.4	0.21	....	2.04	2.25	*2.0*	7.02	2.44	1.84	11.30	*11.0*	9.46	*6.0*	3.27	3.27	*3.0*
23.59	52.6	1.88	....	1.56	3.44	*3.3*	4.37	4.37	1.43	10.17	*9.0*	8.74	*8.0*	7.45	7.45	*7.0*
22.26	52.7	0.38	....	2.38	2.76	*2.3*	6.02	3.08	2.22	11.32	*9.0*	9.10	....	0.46	5.91	*5.0*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10584	Stockbridge Corn.	Bowker Fertilizer Co., Boston.	Sanford & Hawley, Unionville.	$37.00
			Jacob Blakeslee, Watertown.	38.00
			C. T. Leonard, Norwalk.	39.00
10681	Special Potato Manure.	Crocker Fertilizer Co., Buffalo, N. Y.	F. M. Loomis, North Granby.	36 00
10597	Tobacco Fertilizer.	Bradley Fertilizer Co., Boston.	D. T. Dyer, Collinsville.	37.00
			C. K. & H. T. Hale, Gildersleeve.	38.00
				37 50
10564	High Grade Special.	Williams & Clark, New York.	G. H Sloan, Windsorville.	.....
			John Bransfield, Portland.	38.00
			Gault Bros., Westport.	36.00
				37.00
10520	Tobacco Starter.	Bowker Fertilizer Co., Boston.	W. C. Pease, Somers.	36.00
			Bowker's Branch, Hartford.	35.00
			E. F. Miller, Ellington.	33.00
10612	Potato Phosphate.	Cleveland Dryer Co., Boston.	A. H. Bates, Windham Center.	26.00
			C. E. Main, Plainfield.	30.00
				28.00
10606	Special Potato Fertilizer.	Lister's Agricultural Chemical Works, Newark, N. J.	A. W. Hutchinson, Gilead	27.00
			J. C. Leonard & Son, Jewett City.	26.00
			W. B. Martin, Rockville.	27.00
10451	Complete Manure for Top Dressing Grass and Grain.	Bradley Fertilizer Co., Boston.	W. H. Scott, Pequabuck.	36.00
			C. K. & H. T. Hale, Gildersleeve.	35 00
				35.50
10336	Lowell Bone Fertilizer for Corn and Grain.	Lowell Fertilizer Co., Boston.	J. C. Lincoln, Berlin.	25.00
			C. W. Lines, New Britain.	28.00
				26 50
10562	High Grade Fruit Fertilizer.	M. E. Wheeler & Co., Rutland, Vt.	J. F. Blakeslee, North Haven.	28.00
			L. B. Morgan, Plainfield.	24.00
				26.00
10635	Americus Potato Manure.	Williams & Clark, New York.	R. B. Ritter, Brooklyn.	.....
			E. F. Strong, Colchester.	27.00
			John Bransfield, Portland.	30.00
				28.50
10355	Chittenden's Potato Phosphate.	National Fertilizer Co., Bridgeport.	Manufacturer.	.....
			G. A. & H. B. Williams, East Hartford.	32.00
			J. F. Buckhout, Greenwich.	31.00
			A. G. Beach, Seymour.	34.00
10615	Vegetable, Vine, and Tobacco.	Great Eastern Fertilizer Co., Rutland, Vt.	H. S. Harvey, Windham Center.	30.00
			W. M. Tyler, Waterbury.	32.00
			Silas Finch, Greenwich.	32.00
10333	Vegetable, Vine, and Potato Manure.	H. J. Baker & Bro., New York.	Lockwood & Palmer, Stamford.	35.00
			The Meeker Coal Co., Norwalk.	34.00
				34.50
10470	Bowker's Potato and Vegetable.	Bowker Fertilizer Co , Boston.	C T. Leonard, Norwalk.	36.00
			Bowker's Branch, Hartford.	35.00
				32.00

ANALYSES AND VALUATIONS.— *Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$24.78	53.3	0.75	....	2.72	3.47	*3.0*	7.01	2.45	1.25	10.71	*10.0*	9.46	....	7.58	7.58	*6.0*
23.46	53.5	...	1.86	2.08	3.94	*3.7*	7.10	1.87	0.19	9.16	....	8.97	*8.0*	5.25	5.25	*5.0*
24.41	53.6	0.95	.40	2.33	3.68	*3.4*	4.26	4.96	1.50	10.72	*10.0*	9.22	*8.0*	6.94	6.94	*4.0*
23.89	54.9	1.10	.26	2.13	3.49	*3.3*	3.01	6.00	1.83	10.84	*9.0*	9.01	*8.0*	7.18	7.18	*7.0*
22.26	57.2	0.38	....	2.40	2.78	*2.3*	9.34	1.86	1.41	12.61	*12.0*	11.20	*8.0*	0.41	4.15	*3.0*
17.76	57.7	0.23	....	1.98	2.21	*2.1*	6.75	2.82	1.55	11.12	....	9.57	*8.0*	3.13	3.13	*3.0*
16.95	59.3	....	....	1.96	1.96	*1.7*	6.06	3.37	1.34	10.77	*9.0*	9.43	*8.0*	3.00	3.22	*3.0*
22.25	59.6	5.26	....	....	5.26	*4.3*	2.88	3.72	1.05	7.65	*6.0*	6.60	*5.0*	0.56	2.66	*2.5*
16.40	61.6	....	....	1.96	1.96	*1.7*	6.64	1.93	1.27	9.84	*9.0*	8.57	*8.0*	3.39	3.39	*3.0*
16.04	62.1	....	....	....	....	....	8.26	2.54	0.70	11.50	*12.0*	10.80	*10.0*	6.94	7.34	*8 0*
17.46	63.2	0.26	....	1.92	2.18	*2.0*	5.89	3.39	1.80	11.08	*9.0*	9.28	*8.0*	3.14	3.14	*3.0*
19.56	63.6	....	0.56	1.54	2.10	*2.0*	3.55	2.95	0.80	7.30	*8.0*	6.50	*6.0*	3.88	8.38	*10.0*
19.54	63.8	....	..	2.23	2.23	*2.0*	6.59	2.17	1.10	9.86	....	8.76	*8.0*	6.11	6.11	*6.0*
21.04	64.0	...	0.78	1.10	1.88	*1.7*	5.54	0.84	0.44	6.82	*6.5*	6.38	*5.5*	11.69	11.69	*12.0*
19 43	64.7	0.26	...	2.58	2.84	*2.3*	6.58	1.90	1.20	9.68	*10.0*	8.48	*8.0*	4.25	4.25	*4.0*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10711	Complete Tobacco Manure.	H. J. Baker & Bro., New York.	Wm. Stevenson, South Glastonbury.	$42.00
10587	Corn Phosphate.	Bowker Fertilizer Co., Boston.	H. E. Daniels, New London.	26.00
10709	Americus Corn Phosphate.	Williams & Clark, New York.	C. F. Boswell, Preston.	28.00
10622	Animal Corn Fertilizer.	Packer's Union Fertilizer Co., New York.	Rockville Milling Co., Rockville.	29.00
			T. A. Tillinghast, Brooklyn.	28.00
			A. S. Bennett, Cheshire.	32.00
				30.00
10752	*Vegetable and Vine.	Read Fertilizer Co., New York.	J. L. Rice, Beacon Falls	31.00
			N. L. Parmalee, Killingworth.	32.00
				31.50
10563	Havana Tobacco Grower.	M. E. Wheeler & Co., Rutland, Vt.	John Bransfield, Portland.	38.00
			E. E. Pitney, Ellington.	37.00
				37.50
10601	Complete Manure for Corn and Grain.	Bradley Fertilizer Co., Boston.	C. M. Beach, New Milford.	38.00
10450	Potato Fertilizer.	Bradley Fertilizer Co., Boston.	D. L. Clark, Milford.	29.00
			Wilson & Burr, Middletown.	32.00
				30.00
10532	Potato Special.	Pacific Guano Co., Boston.	Carlos Bradley & Son, Ellington.	28.00
			John Bransfield, Portland.	30.00
			Jas. A. Nichols, Danielson.	32.00
10339	High Grade Potato Manure.	Packer's Union Fertilizer Co., New York.	H. L. Hall, Wallingford.	35.00
			A. S. Bennett, Cheshire.	32.00
				33.50
10731	Potato Manure.	Bradley Fertilizer Co., Boston.	C. K. & H. T. Hale, Gildersleeve.	33.00
			H. S. Harvey, Windham Center.	31.00
				32.00
10613	Ammoniated Wheat and Corn Phosphate.	Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	H. F. Cady, Stafford.	31.00
			C. F. Tallard & Son, Broad Brook.	29.00
			H. Davis, Durham Center.	26.00
10849	Potato Manure.	Bradley Fertilizer Co., Boston.	Wheeler & Howe, Bridgeport.	33.00
			D. L. Clark, Milford.	30.00
			E. E. Scoville, Stamford.	34.00
				32.00
10621	Potato Phosphate.	Quinnipiac Co., Boston.	H. S. Coe, Harwinton.	31.00
			C. A. Young, Danielson.	30.00
10535	Northern Corn Special.	Great Eastern Fertilizer Co., Rutland, Vt.	J. N. Saunders, North Stamford.	35.00
			C. A. Sanderson, Moosup.	30.00
				32.50
10629	Corn Fertilizer.	Milsom Rend. & Fertilizer Co., E. Buffalo, N. Y.	Charles H. Davis, Guilford.	28.50
10594	Fish and Potash, Triangle A Brand.		I. J. Scoville, Plainville.	30.00
		Bradley Fertilizer Co., Boston.	C. F. Tallard & Son, Broad Brook.	29.00

* See page 64.

Analyses and Valuations.— *Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen.					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen.		Soluble.	Reverted.	Insoluble.	Total.		Available.		Found.		Guaranteed.
					Found.	Guaranteed.				Found.	Guaranteed.	Found.	Guaranteed.	As Muriate.	Total.	
$25.45	65.0	0.43	1.82	2.59	4.84	*4.5*	5.63	0.59	0 32	6.54	....	6.22	*4.0*	7.42	7.42	*10.0*
15.70	65.6	0.12	....	1.70	1.82	*1.5*	5.97	2.95	2.33	11.25	*11.0*	8.92	*8.0*	2.32	2.32	*2.0*
16.91	65.6	....	....	2.15	2.15	*2.1*	5.36	4.26	2.47	12.09	*10.0*	9.62	*9.0*	1.96	1.96	*1.5*
18.09	65.8	....	0.29	2.57	2.86	*2.5*	6.37	2.53	1.18	10.08	...	8.90	*8.0*	2.19	2.19	*2.0*
18.89	66.8	0.04	....	1.90	1.94	*1.7*	5.50	2.21	0.96	8.67	*7.0*	7.71	*6.0*	7.50	7.50	*8.0*
22.45	67.0	....	....	3.08	3.08	*2.9*	5.54	2.32	1.22	9.08	....	7.86	*6.0*	7.63	7.63	*7.0*
22.72	67.3	....	0.75	2.61	3.36	*3.3*	5.20	6.82	1.85	13.87	*13.0*	12.02	*12.0*	2.86	2.86	*3.0*
17.88	67.8	....	....	2.17	2.17	*2.1*	5.20	4.18	2.75	12.13	*11.0*	9.38	*9.0*	3.15	3.15	*3.3*
17.86	68.0	0.18	....	1.98	2.16	*2.1*	6.08	3.53	2.17	11.78	*9.0*	9.61	*8.0*	3.16	3.16	*3.0*
19.94	68.0	....	....	2.29	2.29	*2.1*	7.02	1.94	1.06	10.02	....	8.96	*8.0*	6.16	6.16	*6.0*
19.02	68.2	....	0.22	2.52	2.74	*2.5*	3.79	3.15	2.68	9.62	*8.0*	6.94	*6.0*	5.11	5.11	*5.0*
17.22	68.4	....	....	2.28	2.28	*2.0*	7.49	3.10	0.60	11.19	....	10.59	*10.0*	1.62	1.62	*1.6*
18.83	69.9	..	0.20	2.42	2.62	*2.5*	3.47	3.38	2.71	9.56	*9.0*	6.85	*6.0*	5.10	5.10	*5.0*
18.15	70.8		....	2.26	2.26	*3.1*	4.86	5.12	2.16	12.14	*9.0*	9.98	*8.0*	2.93	2.93	*3.0*
18.96	71.4		0.28	2.82	3.10	*3.0*	6.93	2.10	1.15	10.18	....	9.03	*8.0*	2.23	2.23	*2.0*
16.51	72.6	...	....	2.26	2.26	*2.5*	6.40	2.43	1.84	10.67	*9.0*	8.83	*8.0*	2.05	2.05	*2.0*
16.77	72.9	....	0.32	2.14	2.46	*2.0*	2.72	3.19	1.92	7.83	*6.0*	5.91	....	4.84	4.84	*4.0*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10421	Potato Manure.	Quinnipiac Co., Boston.	C. Buckingham, Southport.	$30.00
			Adams & Canfield, Winnipauk.	32.00
			Olds & Whipple, Hartford.	34.00
10489	Special Potato Fertilizer.	Milsom Rendering & Fertilizer Co., East Buffalo, N. Y.	Charles H. Davis, Guilford.	31.00
			D. E. Doolittle, West Cheshire.	32.00
10494	Potato, Hop, and Tobacco Phosphate.	Crocker Fertilizer Co., Buffalo, N. Y.	Haley & Chesebro, Stonington.	31.00
			H. C. Porter, Hebron.	33.00
				32.00
10518	High Grade Special Potato.	E. Frank Coe Co., New York.	H. B. Sherwood, Southport.	.....
			J. O. Fox, Putnam.	38 00
10636	Potato Phosphate.	Williams & Clark, New York.	D. B. Wilson, Waterbury.	30.00
			T. B. Atwater, Plantsville	35.00
				32.50
10527	Corn Fertilizer.	M. E. Wheeler & Co., Rutland, Vt.	J. F. Blakeslee, North Haven.	30.00
			C. I. Harvey & Son, Middletown.	28.00
			C. K. Ranney, Cromwell.	28.50
			G. C. Ingham, Saybrook.	30.00
			Dwight Gallup, Old Mystic.	28.00
			L. B. Morgan, Plainfield.	25.00
10773	*Wheat, Oats, and Barley.	Milsom Rend. & Fertilizer Co., E. Buffalo, N. Y.	J. A. Loomis, Manchester	25.00
10517	Potato Fertilizer.	Clark's Cove Fertilizer Co., New York.	F. A. Hunt, Columbia.	30.00
			J. M. Burke, Manchester.	32.00
			J. R. Ballard, Thompson.	32.00
				31.50
10664	*Vegetable and Vine.	Read Fertilizer Co., New York.	J. N. Clark, Columbia.	32 00
10531	Grass and Grain Fertilizer.	Pacific Guano Co., Boston.	Jas. A. Nichols, Danielson.	26.00
			Carlos Bradley & Son, Ellington.	24.00
				25.00
10651	Special for Potatoes.	Standard Fertilizer Co., Boston.	W. E. Truesdell & Co., Burnside.	32.00
10529	Corn Manure.	Quinnipiac Co., Boston.	S. V. Osborn & Co., Branford.	30.00
			C. A. Young, Danielson.	29.00
			W. C. Pease, Somers.	30.00
10476	Universal Grain Grower.	Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	Clark & Bradley, North Westchester.	22.00
			Henry Davis, Durham Center.	22.00
10702	Wheat, Oats, and Clover Fertilizer.	Packers' Union Fertilizer Co., New York.	A. S. Bennett, Cheshire.	22.00
			Rockville Milling Co., Rockville.	24.00
			H. L. Hall, Wallingford.	22.00
10468	Potato and Vegetable Phosphate.	Bowker Fertilizer Co., Boston.	D. B. Wilson, Waterbury.	30.00
			J. C. Lincoln, Berlin.	30.00
			Linsley & Lightbourn, New Haven.	35.00

* See page 64.

ANALYSES AND VALUATIONS.— *Continued.*

Valuation per ton.	Percentage difference betwen cost and valuation.	NITROGEN.					PHOSPHORIC ACID.							POTASH.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen. Found.	Total Nitrogen. Guaranteed.	Soluble.	Reverted.	Insoluble.	Total. Found.	Total. Guaranteed.	Available. Found.	Available. Guaranteed.	Found. As Muriate.	Found. Total.	Guaranteed.
$18.46	73.3	0.53	....	2.15	2.68	*2.5*	1.07	5.91	2.14	9.12	*7.0*	6.98	*6.0*	5.30	5.30	*5.0*
17.84	73.8	....	...	1.50	1.50	*1.6*	5.49	2.36	0.96	8.81	*10.0*	7.85	*8.0*	7.56	7.56	*8.0*
18.37	74.2	....	....	2.24	2.24	*2.0*	5.66	4.15	1.49	11.30	...	9.81	*10.0*	3.63	3.63	*3.3*
21.72	75.0	....	0.89	1.74	2.63	*2.4*	6.32	2.03	2.64	10.99	*9.0*	8.35	*7.0*	.24	6.03	*6.5*
18.45	76.1	0.68	....	1.99	2.67	*2.5*	.75	6.31	1.91	8.97	*7.0*	7.06	*6.0*	4.85	5.35	*5.0*
16.09	77.1	....	....	2.04	2.04	*1.6*	6.67	2.41	1.08	10.16	....	9.08	*8.0*	2.37	2.37	*2.0*
14.05	77.9	....	....	1.40	1.40	*1.2*	5.68	3.03	2.56	11.27	*9.0*	8.71	*8.0*	.50	1.65	*2.0*
17.68	78.2	...	....	2.10	2.10	*2.1*	6.72	2.89	1.74	11.35	*9.0*	9.61	*8.0*	3.22	3.22	*3.0*
17.69	80.9	....	....	1.84	1.84	*1.7*	5.78	1.54	0.60	7.92	*7.0*	7.32	*6.0*	6.90	6.90	*8.0*
13.60	83.8	....	...	1.21	1.21	*0.8*	6.66	2.70	1.68	11.04	*8.0*	9.36	*7.0*	1.64	1.64	*1.0*
17.29	85.1	....	....	2.02	2.02	*2.0*	4.83	4.55	2.57	11.95	*9.0*	9.38	*8.0*	3.07	3.07	*3.0*
16.17	85.5	....	....	2.12	2.12	*2.1*	7.55	2.26	1.01	10.82	*10.0*	9.81	*9.0*	1.43	1.43	*1.5*
11.82	86.1	....	....	0.92	0.92	*0.8*	4.45	2.99	0.90	8.34	...	7.44	*7.0*	2.92	2.92	*2.7*
11.82	86.1	....	....	....	....	....	7.04	4.38	1.00	12.42	....	11.42	*11.0*	1.86	1.86	*2.0*
16.12	86.1	0.21	....	1.67	1.88	*1.5*	6.34	2.76	3.00	12.10	*10.0*	9.10	*8.0*	2.08	2.08	*2.0*

Special Manures Sampled by the Station.

Station No.	Name of Brand.	Manufacturer.	Dealer.	Dealer's cash price per ton.
10561	Potato Manure.	M. E. Wheeler & Co., Rutland, Vt.	G. C. Ingham, Saybrook.	$34.00
			John Bransfield, Portland.	34.00
			C. K. Ranney, Cromwell.	31.00
			F. E. Larrabee, Marion.	33.00
			J. F. Blakeslee, North Haven.	32.00
10522	Corn Phosphate.	Bradley Fertilizer Co., Boston.	W. W. Sheldon, South Woodstock.	30.00
			Quinnebaug Store, Danielson.	33.00
			W. H. Scott, Pequabuck.	29.00
				31.00
10453	Potato, Hop, and Tobacco Fertilizer.	Niagara Fertilizer Co., Buffalo, N. Y.	Wm. Higgins, New London.	30.00
			W. R. Atwell, Durham.	30.00
10490	Potato, Hop, and Tobacco Phosphate.	Milsom Rend. & Fertilizer Co., E. Buffalo, N. Y.	D. E. Doolittle, West Cheshire.	30.00
			Chas. H. Davis, Guilford.	29.50
10665	Grass Fertilizer.	Quinnipiac Co., Boston.	Bailey & Markham, Cobalt.	35.00
10690	Grain and Grass Grower.	Niagara Fertilizer Works, Buffalo, N. Y.	Wm. Higgins, New London.	23.00
10703	Grass and Oats Fertilizer.	M. E. Wheeler & Co., Rutland, Vt.	G. C. Ingham, Saybrook.	24.00
10630	Practical Potato Special.	Read Fertilizer Co., New York.	Pascoe Bros., Winsted.	28.00
			J. R. Babcock, Mystic.	28.00
			J. W. Palmer, Stamford.	32.00
10730	*Wheat and Corn Producer.	Niagara Fertilizer Co., Buffalo, N. Y.	J. W. Cutler, Putnam.	28.00
10694	†Wheat, Oats, and Barley Phosphate.	Milsom Rend. & Fertilizer Co., E. Buffalo, N. Y.	D. E. Doolittle, West Cheshire.	26.00
10417	*Wheat and Corn Producer.	Niagara Fertilizer Co., Buffalo, N. Y.	Wm Higgins, New London.	26.00
			W. R. Atwell, Durham.	30.00
			C. A. Ahlquist, Portland.	30.00
				29.00
10536	Grass and Oats Phosphate.	Great Eastern Fertilizer Co., Rutland, Vt.	C. A. Sanderson, Moosup.	25.00
			H. S. Harvey, Windham Center.	21.00
			J. N. Saunders, North Stamford.	28.00

* See page 65.

† See page 64.

Analyses and Valuations.— *Continued.*

Valuation per ton.	Percentage difference between cost and valuation.	Nitrogen					Phosphoric Acid.							Potash.		
		Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen Organic.	Total Nitrogen. Found.	Total Nitrogen. Guaranteed.	Soluble.	Reverted.	Insoluble.	Total. Found.	Total. Guaranteed.	Available. Found.	Available. Guaranteed.	Found. As Muriate.	Found. Total.	Guaranteed.
£17.61	87.4	....	....	2.33	2.33	*2.0*	6.62	2.15	1.13	9.90	....	8.77	*8.0*	3.48	3.48	*3.8*
16.49	88.0	....	....	2.14	2.14	*2.1*	6.53	3.28	1.91	11.72	*10.0*	9.81	*9.0*	1.46	1.46	*1.5*
15.91	88.6	....	....	2.02	2.02	*1.6*	5.95	2.97	0.70	9.62	*8.0*	8.92	....	2.62	2.62	*2.7*
15.86	89.2	....	....	1.88	1.88	*2.1*	5.42	2.36	1.10	8.88	*9.0*	7.78	*8.0*	3.99	3.99	*4.0*
18.49	89.3	....	4.05	0.02	4.07	*3.9*	3.92	1.53	0.84	6.29	*6.0*	5.45	*5.0*	2.35	2.35	*2.0*
11.80	94.9	....	....	1 36	1.36	*0.8*	3.54	4.23	1.24	9.01	....	7.77	*7.0*	1.08	1.08	*1.0*
12.25	95.9	....	....	....	....	....	7.26	4.49	1.07	12.82	....	11.75	*11.0*	2.00	2.00	*3.0*
13.83	102.5	....	....	1.06	1.06	*0.8*	2.85	1.98	0.65	5.48	*5.0*	4.83	*4.0*	7.59	7.59	*8.0*
13.61	105.7	....	....	1.48	1.48	*1.8*	5.36	3 34	0.55	9.35	....	8.70	*8.0*	2.02	2.02	*2.2*
12.13	114.3	....	....	1.28	1.28	*1.2*	4.93	2.35	1.96	9.24	*9.0*	7.28	*8.0*	1.70	1.70	*2.0*
13.46	115.4	...	....	1.50	1.50	*1.2*	5.44	2.96	0.64	9.04	*8.0*	8.40	....	2.03	2.03	*2.1*
11.58	115 9	....	....	....	....	....	7.41	3.62	0.97	12.00	....	11.03	*11.0*	1.91	1.91	*2.0*

2 and 3. Special Manures Sampled by Manufacturers and Purchasers.

The three samples described below were sent for analysis by purchasers.

10364. Scientific Potato Fertilizer. Made by the Scientific Fertilizer Co., Pittsburg, Pa. Sampled and sent by R. K. Woodward, Amenia Union, N. Y.

10406. Special Soluble Potato and Onion Manure. Made by J. G. Downward & Co., Coatesville, Pa. Sampled and sent by J. H. Thomas, Southport.

10725. Mapes Tobacco Starter. Made by the Mapes Formula and Peruvian Guano Co., N. Y. Sampled and sent by C. J. Dewey, Buckland.

ANALYSES.

	10364	10406	10725
Nitrogen of nitrates	....	0.62	1.83
" ammonia.	....	1.00	0.20
" organic	2.98	1.99	1.09
Total Nitrogen found	2.98	3.61	3.12
" *guaranteed*	*3.0*	*4.0*	*2.5*
Soluble Phosphoric Acid	3.82	5.14	4.26
Reverted " "	4.66	2.87	6.60
Insoluble " "	1.78	1.25	1.87
Total Phosphoric Acid found	10.26	9.26	12.73
" " *guaranteed*	*9.0*	*8.0*	*12.0*
Potash as muriate	0.44	5.46	0.52
" sulphate	5.29	....	2.79
Total Potash found	5.73	5.46	3.31
" *guaranteed*	*6.0*	*6.0*	*2.5*
Cost per ton	$23.00	$28.00	$35.00
Valuation per ton	....	22.05	21.46

The organic nitrogen of the Special Soluble Potato and Onion Manure, **10406,** made by J. G. Downward & Co., is soluble in acid pepsin solution to the extent of 75.9 per cent., indicating that it is readily available to plants.

Inferior Forms of Nitrogen.

The nitrogen of the Scientific Potato Fertilizer, **10364,** is apparently of quite inferior agricultural value, as only 33.5 per cent. of it is soluble in acid pepsin solution. For this reason no valuation is attached, as a valuation presupposes that the nitrogen of the fertilizer is derived from animal and vegetable matters which are quickly and fully available.

Home Mixtures.

In the following table are analyses of twenty-four mixtures made by the persons named, for their own use. With the analyses are given the formulas by which they were compounded.

The cost price named does not include the cost of mixing, usually estimated at from one to two dollars per ton. If two dollars per ton were added to the cost of these mixtures, for mixing, their average cost per ton would be $27.94, their average valuation $25.05, and the percentage difference between cost and valuation, 11.5. The economy of home mixing as compared with buying factory-mixed goods is discussed on page 99.

Home Mixtures, Formulas (☞)

Station No.	Made by	Formulas, Pounds Per Ton of Mixture.													
		Nitrate of Soda.	Sulphate of Ammonia.	Cotton Seed Meal.	Dry Ground Fish.	Ground Bone.	Dissolved Bones.	Tankage.	Dissolved Bone Black.	Acid Phosphate.	Muriate Potash.	Sulphate Potash, High Grade.	Sulphate Potash, Low Grade.	Wood Ashes.	Kainit.
10416	F. T. Bradley, Saybrook.							1700			300				
10375	D. Fenn, Milford.	198						790	790		222				
10726	C. J. Dewey, Buckland.	125						750	750		200		200		
10497	P. K. Hoadley, No. Guilford.	100	300			800				300	500				
10387	W. B. Miller, Middlefield.														
10516	E. E. Burwell, New Haven.														
10515	E. E. Burwell, New Haven.														
10247	S. D. Woodruff & Sons, Orange.	100						800		800	300				
10575	L. Sanderson, for N. D. Platt.	200				300		700	700		100				
10576	L. Sanderson, for N. D. Platt.	200				300		700	700		100				
10577	L. Sanderson, for N. D. Platt.	100	66			167		667	667		166		167		
10465	F. B. Northam, Cobalt.	300						*400		700		400			
10455	Clifton Peck, Yantic.							1266		200	534				
10456	Clifton Peck, Yantic.	552						207		1241					
10454	Clifton Peck, Yantic.	210						737		737	316				
10457	Clifton Peck, Yantic.	200						800		800	200				
10501	C. B. Pomeroy, Jr., Willimantic.			1000						700	300				
10434	L. Sanderson, for George F. Platt & Son.	200				200		800	800						
10435	L. Sanderson, for George F. Platt & Son.	200				200		700	700		200				
10290	J. P. O'Connor, Wethersfield.	300			250	200			600				600	50	
8996	E. E. Burwell, New Haven.	150	75				1265					510			
10551	A. C. Lake, Bethlehem.	150				900				500	275	175			
10550	A. C. Lake, Bethlehem.	140						785		700	200	175			
10557	W. C. Pease, Somers.	857				572									571

* Also 200 pounds dried blood.

MISCELLANEOUS FERTILIZERS AND MANURES.

Cotton Hull Ashes.

In the tables on pages 84 and 85 are given analyses of 47 samples of this material which is extensively used as a source of potash for fertilizing tobacco lands in this State.

These analyses show the usual wide range of composition, especially as regards potash, the ingredient for which the ashes are bought.

Analyses and Valuations.

Analyses.									Cost (Unmixed) and Valuation.	
Nitrogen as Nitrates.	Nitrogen as Ammonia.	Nitrogen, Organic.	Total Nitrogen.	Soluble Phosphoric Acid.	Reverted Phosphoric Acid.	Insoluble Phosphoric Acid.	Total Phosphoric Acid.	Potash.	Cost Per Ton.	Valuation Per Ton.
.....	.....	5.24	5.24	.....	.....	.....	3.79	7.31	.....	.....
1.40	.....	2.23	3.63	6.98	4.04	.93	11.95	5.90	$30.00	$24.78
1.09	.....	2.55	3.64	5.65	3.48	1.60	10.73	7.66	33.00	24.99
.67	2.89	.90	4.46	1.34	7.72	.56	9.62	12.46	32.75	30.55
1.72	....	2.30	4.02	3.25	2.56	1.05	6.86	7.07	.....	22.32
.38	.....	4.02	4.40	4.67	2.75	.36	7.78	3.13	23.75	21.45
.35	1.18	1.94	3.47	5.01	2.26	.55	7.82	8.68	29.45	24.48
.92	.....	2.22	3.14	5.65	3.94	1.63	11.22	8.53	25.00	24.75
.96	.....	2.80	3.76	4.90	8.93	2.76	16.59	1.88	26.50	24.59
.93	.....	2.77	3.70	5.84	7.88	2.78	16.50	2.27	26.50	24.78
.61	.36	3.30	4.27	4.77	4.39	1.68	10.84	5.98	28.00	25.42
2.38	.....	2.26	4.64	2.56	2.28	1.25	6.09	9.65	.....	26.24
.....	.....	3.60	3.60	.74	3.02	2.02	5.78	13.83	29.00	31.73
3.72	.....	.74	4.46	6.67	2.88	1.07	10.62	.....	23.00	20.47
1.35	....	2.49	3.84	3.33	3.83	1.68	8.84	7.14	25.00	23.28
1.20	.....	2.43	3.63	3.74	3.48	2.12	9.34	4.68	25.00	20.90
.....	.....	3.83	3.83	3.46	2.13	.99	6.58	8.81	22.60	23.42
1.80	.....	1.92	3.72	8.98	3.21	.92	13.11	.....	26.00	21.08
1.36	... ..	3.45	4.81	4.74	4.62	1.39	10.75	6.96	28.00	27.65
3.04	.....	1.68	4.72	3.42	2.94	.91	7.27	7.70	24.98	25.88
1.38	.25	2.54	4.17	3.46	12.53	1.20	17.19	9.50	45.00	34.43
.81	.....	1.52	2.33	4.32	6.57	4.82	15.71	10.66	28.50	26.99
1.02	.....	2.44	3.46	5.07	2.60	.70	8.37	9.62	24.66	24.92
4.11	.....	1.02	5.13	.....	.....	.....	6.36	3.90	28.00	20.99

The highest percentage of potash was 31.09, the lowest, 15.08, while the average percentage was 23.3, slightly higher than the average in the previous year (22.4).

Allowing 4½, 4, and 2 cents per pound respectively for water-soluble, citrate soluble and insoluble phosphoric acid, the water-soluble potash has cost from 4.8 to 10.7 cents per pound, or 7.1 cents per pound on the average.

The average cost of potash per pound would have been considerably higher but for the fact that in most cases the ashes were bought of responsible dealers who gave a guarantee of the per cent. of potash, and when the ashes were shown by the

Station analysis to fall short of this guarantee, the dealers made a reduction of price. In making contracts the percentage of "water-soluble potash" should be guaranteed, not simply of "potash" without qualification. This Station bases its valuation on the water-soluble form only. Ashes contain more or less potash in form of silicates, which are quite insoluble and inferior or inert as plant food. Thus, in sample No. 10480 there was 19.58 per cent. of water-soluble potash, while the

COTTON HULL ASHES.

Station No.	Dealer or Purchaser.	Supplied by
10147	J. W. Walker & Co., Houston, Tex.,	C. D. Burbank, Thompsonville,
10268	W. S. Pinney, Suffield,	W. H. Prout, Suffield,
10360	W. S. Pinney, Suffield,	D. I. King, Windsor Locks,
10219	Olds & Whipple, Hartford,	Olin Wheeler, Buckland,
10821	Olds & Whipple, Hartford,	S. E. Wilcox, Hartford,
10358	Chas. L. Spencer, Suffield,	F. B. Hathaway, Windsor Locks,
10218	Olds & Whipple, Hartford,	
10573	Olds & Whipple, Hartford,	P. P. Hickey, Burnside,
10410	Olds & Whipple, Hartford,	John DuBon, Poquonock,
10291	Chas. L. Spencer, Suffield,	E. S. Seymour, Windsor Locks,
10504		Geo. C. Eno, Simsbury,
10480		John A. DuBon, Poquonock,
10111	Olds & Whipple, Hartford,	Frank S. Taylor, Hartford,
10182	Edmund Halladay, Suffield,	Edmund Halladay, Suffield,
10183	Edmund Halladay, Suffield,	Edmund Halladay, Suffield,
10382	Olds & Whipple, Hartford,	Station Agent,
10114	Olds & Whipple, Hartford,	Olin Wheeler, Buckland,
10180	Olds & Whipple, Hartford,	T. P. Kinney, Windsor,
10196	Olds & Whipple, Hartford,	F. L. Chandler, South Woodstock,
10112	Olds & Whipple, Hartford,	Olin Wheeler, Buckland,
10113	Olds & Whipple, Hartford,	Olin Wheeler, Buckland,
10321		Clinton Spencer, Suffield,
10320	W. W. Cooper, Suffield,	C. F. Tilden, Thompsonville,
10280	C. L. Spencer, Suffield,	S. O. Ranney, Windsor Locks,
10184	Olds & Whipple, Hartford,	A. E. Holcomb, Poquonock
10221	Chas. L. Spencer, Suffield,	F. L. Woodworth, Thompsonville,
10195	W. S. Pinney, Suffield,	C. D. Woodworth, Thompsonville,
10151	W. S. Pinney, Suffield,	G. H. Harman, Suffield,
10368	Edmund Halladay, Suffield,	Edmund Halladay, Suffield,
10507	Olds & Whipple, Hartford,	Geo. Rengermann, East Granby,
10572	R. W. Cowles, Tariffville,	N. T. Case, Tariffville,
10324	W. S. Pinney, Suffield,	Pitcher & Phillips, Thompsonville,
10233	W. S. Pinney, Suffield,	G. A. Douglass, Thompsonville,
10431	Olds & Whipple, Hartford,	C. D. Cannon, Windsor Locks,
10110	Olds & Whipple, Hartford,	Frank S. Taylor, Hartford,
10505	Clinton Spencer, Suffield,	E. A. Pomeroy, Suffield,
10319	Edmund Halladay, Suffield,	Arthur H. Humason, Suffield,

total potash was 21.86 per cent. Sample No. **10321**, contained 17.90 per cent. of water-soluble potash, but the total per cent. of potash was 20.80.

Corn-cob Ashes.

8999. Sent by J. A. DuBon. Sample from Chas. G. Eno, Osborn, Kansas. The ashes are stated to be procurable in some quantity in Kansas and neighboring states.

Analyses.

Soluble Phosphoric Acid.	Reverted Phosphoric Acid.	Insoluble Phosphoric Acid.	Total Phosphoric Acid.	Potash Soluble in Water.	Cost per Ton.	Valuation per Ton.	Potash Costs cents per pound.
.14	4.48	.74	5.36	29.24	$32.00	$23.25	4.8
1.73	8.48	.50	10.71	27.32	40.00	35.86	5.8
1.68	8.38	.49	10.55	26.88	40.00	35.29	5.9
2.85	6.75	.94	10.54	31.09	45.00	39.43	5.9
.54	7 83	.87	9.24	23.89	40.00	30.99	6.1
1.30	7.20	.63	9.13	26.86	40.00	34.04	6.1
2.14	11.77	.49	14.40	25.14	43.00	36.69	6.2
2.53	6.89	.72	10.14	29.76	45.00	37.84	6.2
.83	6 66	.72	8.21	19.98	31.50	26.35	6.3
2.40	8.90	.97	12.27	23.92	40.00	33.59	6.3
2.13	6 79	.65	9.57	29.88	45.00	37.49	6.3
1.30	6.39	.75	8.44	19.58	31.50	26.16	6.4
.53	11 01	.89	12.43	23.22	40.00	32.87	6.5
.66	6.06	1.16	7.88	24.08	38.00	29.98	6.7
1.44	6.17	1.51	9.12	22.82	38.00	29.66	6.8
1.54	7.55	.89	9.98	23.64	40.00	31.43	6.8
.76	9.43	2.35	12.54	25.00	43.00	34.16	6.8
.21	6.88	1.02	8.11	23.42	38.50	29.52	6.9
.69	7.04	.50	8.23	26.50	43.00	32.95	6.9
.40	8.42	.53	9.35	26.88	45.00	34.19	7.0
.35	8.61	.63	9.59	24.54	43.00	32.00	7.2
.46	3.83	1.33	5.62	17.90	30.00	21.90	7.3
.69	6.55	.81	8.05	23.08	40.00	29.26	7.3
2.00	9.34	1.06	12.40	20.30	40.00	29.99	7.4
.08	6.18	1.12	7.38	21.80	38.00	27.26	7.5
.69	6.99	1.06	8.74	22.24	40.00	28.87	7.5
.50	7.19	1.03	8.72	22.32	40.00	28.93	7.5
.54	7.47	1.09	9.10	20.30	38.00	27.21	7.6
.40	4.82	.78	6.00	22.58	39.00	27.11	7.6
trace	5.27	.51	6.78	24.90	43.00	30.12	7.6
1.38	6 87	.92	9.17	24.46	42.00	29 57	7.8
.48	7 45	1.05	8.98	20.64	40.00	27.45	8.0
.35	7.73	1.09	9.17	20.56	40.00	27.50	8.0
.21	7.39	.79	8.39	20.76	40.00	27.18	8.1
none	3.95	1.87	5.82	12.30	25.00	16.21	8.5
.24	3.77	1.11	5.12	19.46	40.00	23.14	9 3
.78	5.90	.94	7.62	15.08	38.00	20.88	10.7

ANALYSIS.

Water-soluble phosphoric acid,	2.37 per cent.
Citrate " " "	.97 "
Insoluble " "	.67 "
Potash soluble in water,	21.13 "

These ashes contain about the same percentage of potash as cotton-hull ashes, but less than half as much phosphoric acid.

WOOD ASHES.

In the table, pages 88 and 89, are given nineteen analyses of wood ashes.

10130 is a sample from the Coe Brass Co. of Torrington. These ashes cost 15 cents per bushel of 45 pounds, from which is calculated the ton price, $6.67.

The three samples sent by W. H. Olcott of So. Manchester represent ashes from heaps which have been leached by exposure to the weather.

The samples show the usual range of composition. Nearly a quarter of the weight of sample **10244** consists of sand and soil, " gathered " with the ashes, which explains the low percentage of potash. The low percentages of potash in samples **10509** and **10642** are explained in the same way.

Samples **10604, 10605, 10510,** and **10727** represent ashes of low grade and probably partly leached.

The average composition of unleached (and unsanded) ashes for the last four years has been:

	1895. 16 Samples.	1896. 22 Samples.	1897. 21 Samples.	1898. 9 Samples.
Potash, soluble in water,	4⅓	5½	5½	5½
Phosphoric Acid,	1½	1½	1⅕	1½
Lime,	34	32½	32½	36½
Sand and soil,	12¼	11	10½	5
Charcoal,	2	2½	2	1⅓
Cost per ton,	$10.75	$10.36	$10.30	$9.45*

Ashes are sometimes sold with a guarantee of 5.0 per cent. of " potash." This Station, as a rule, determines only the potash soluble in water; for the reason that only potash which is freely soluble can be regarded as immediately available to vegetation. Green sand marl, felspar, and glass all may con-

* Excluding one exceptionally low price, the average is $9.82.

tain considerable quantities of "potash," but in forms which yield it up to the roots of plants extremely slowly.

The lime contained in ashes is often their most valuable ingredient for agricultural purposes. A ton of unleached wood ashes, calculated from the average of the analyses given above contains 732 pounds of lime, 111 pounds of potash, and 30 pounds of phosphoric acid, costing $9.82. Allowing 5 cents per pound each for potash and phosphoric acid, the pure lime (calcium oxide), in the nine samples, has cost thirty-eight cents for 100 pounds.

Lime-kiln Ashes.

The two samples, whose analyses appear in the table, p. 88, contained 31.38 and 40.48 per cent. of lime, respectively, with 1.06 and 0.99 per cent. of potash. Reckoned on the same basis as in the unleached ashes, pure lime in the one of these samples whose price is given, cost forty-eight cents per 100 pounds, ten cents more per hundred than in wood ashes.

Oyster-shell Lime.

A single sample of this material is included in the table, page 88. The pure lime contained in it costs 81 cents per 100 pounds. The price quoted is at the rate charged for single barrel lots of 250 pounds.

SOURCES, ANALYSES, AND COST OF

Station No.	Dealer or Purchaser.	Sampled or sent by.
	Wood Ashes.	
10362	Allison Co., Fulton St., New York City,	Ernest N. Austin, Suffield,
10292	Bowker Fertilizer Co., Boston, per A. G. Smith, Wethersfield,	Jas. P. O'Connor, Wethersfield,
10107	F. R. Lalor, Dunville, Ont.,	John E. Frisbie, Southington,
10244	F. R. Lalor, Dunville, Ont.,	T. D. Barclay, Kent,
10284	F. R. Lalor, Dunville, Ont.,	G. A. Isbell, 708 Chapel St., N. Haven,
10604	F. R. Lalor, Dunville, Ont.,	H. C. C. Miles, Milford,
10605	F. R. Lalor, Dunville, Ont.,	Geo. F. Platt & Son, Milford,
10318	George Munroe, Oswego, N. Y.,	Earl Cooley, Berlin,
10342	George Munroe, Oswego, N. Y.,	Geo. W. Spicer, Deep River,
10839	George Munroe, Oswego, N. Y.,	Horace Hurlbutt, Weston,
10130	Coe Brass Co., Torrington,	Wm. J. Barber, Harwinton,
10509	T. Potts, Brantford, Ont.,	J. H. Hale, So. Glastonbury,
10642	Thomas Potts, Brantford, Ont.,	J. H. Hale, So. Glastonbury,
10004	Local Sawmill,	W. H. Olcott, So. Manchester,
10108	Local Sawmill,	W. H. Olcott, So. Manchester,
10152	Local Sawmill,	W. H. Olcott, So. Manchester,
10002		Thomas L. Craik, Greenfield Hill,
10510		A. E. Hollister, Glastonbury,
10727	Mr. Smith Wethersfield,	Thomas H. L. Tallcott, Glastonbury,
	Lime-kiln Ashes.	
10376	East Canaan,	Daniels Bros., Middletown,
10848	A. S. Farnham & Bros., Cheshire, Mass.,	John W. Palmer, Stamford,
	Oyster-shell Lime.	
10359	Edward Austen, Suffield,	F. B. Hathaway, Windsor Locks,

LAND PLASTER.

A sample, 10477, sent by A. H. Clark, Poquonock, drawn from stock of Olds & Whipple, Hartford, contained:

Water,	6.29 per cent.
Insoluble in acid, sand, etc.,	0.74 "
Calcium sulphate, hydrated (gypsum),	78.46 "
Calcium carbonate and other matters, by difference,	14.51 "
Total,	100.00

The cost is $10 per ton.

This has the composition of Cayuga or Onondaga plaster. Nova Scotia plaster contains but little, if any, carbonate of lime.

WOOD ASHES AND OF LIME-KILN ASHES.

Potash Soluble in Water.	Phosphoric Acid.	Lime, Calcium Oxide.	Carbonic Acid.	Sand and Soil.	Charcoal.	Cost per ton.
4.41	1.26	28.45	17.31	7.06	0.88	$9.50
6.60	1.18	31.99	17.61	3.49	0.98	10.00
5.22	1.28	46.51	22.54	3.40	0.64	10.50
2.99	1.46	28.90	16.38	23.17	2.76	10.00
5.70	1.30	39.79	19.44	3.86	1.12	9.50
3.17	1.13	34.65	20.78	3.39	1.30	10.00
2.84	1.13	37.14	23.38	3.34	1.67	10.00
7.13	1.66	35.76	21.27	6.39	1.31	10.00
5.35	1.41	34.46	21.09	6.20	1.25	10.00
5.02	1.32	34.35	20.67	4.60	1.52	9.50
4.56	2.44	37.95	28.24	2 60	3.10	6.67
2.99	1.25	23.54	14 29	19.60	3.27	8.00
3.16	1.60	27.74	18.10	20.49	3.54	8.00
0.85	0.79	14.43	8.18	*36.50	5.26	....
0.42	....	19.20	12.19	26.03	1.11	....
1.68	1.15	25.41	14.37	38.66	3.91	....
5.85	1.51	40.14	22.29	7.39	1.07	9.50
3.07	0.75	47.20	26.56	1.78	0.49	....
3.36	0.88	47.55	25.17	2.12	0.95	11.00
1.06	0.90	31.38	23.29	1.64	5.21	....
0.99	0.60	40.48	18.71	2.39	3.02	5.50
....	....	61.64	8 89	6.28	...	10.00

BAT GUANO.

10188. This material, sent by Olin Wheeler, Buckland, is found in caves where bats resort in large numbers. The sample had the following composition:

	Bat Guano. 10188
Nitrogen as nitrates,	1.50
" Ammonia,	.58
" Organic,	2.87
Total Nitrogen found,	4.95
" guaranteed,	...

* Water, 26.93.

	Bat Guano.
Phosphoric Acid, soluble,	.45
" reverted,	5.98
" insoluble,	4.93
Phosphoric Acid, total,	11.36
Potash as muriate,	.49
" sulphate,	.26
Total Potash found,	.75
Chlorine,	.20

The organic nitrogen of bat guano comes almost entirely from the chitinous wing-cases of insects and is known to be very inert as a fertilizer. It is almost entirely insoluble in pepsin solution.

Street Sweepings.

10129. A sample sent by P. P. Hickey, Burnside, is stated to consist of the sweepings from asphalt pavements in Hartford, offered as a manure.

The analysis is as follows:

Water,	14.48
Organic and Volatile matters,	10.70
Sand and Soil,	66.60
Other Mineral Matter,	8.22
	100.00
In the Organic Matter, Nitrogen,	0.19
In the Mineral Matter, Phosphoric Acid,	0.15
Potash,	0.07

Ground Weed Seed.

10154. A sample sent by A. N. Farnham, New Haven, contained:

Nitrogen,	2.72
Phosphoric Acid,	1.16
Potash,	0.87

This material is stated to be the ground residue left from the cleaning of grain, and it was proposed to use it in the compost heap.

Rotted Peat.

8997 and **8998.** Samples taken from a peat swamp in East Haven by E. E. Burwell of New Haven. The first represents the upper layer, taken between one foot and two and a half feet from the surface. The second was taken between two and four feet down.

Analyses.

	8997	8998
Water,	35.54	34.18
*Organic Matter,	53.05	58.87
Mineral Matter, soluble in Acid,	7.01	6.55
" insoluble in Acid (sand and soil),	4.40	0.40
	100.00	100.00
*Containing Nitrogen,	1.85	1.41

The lower layer contains less sand and more organic matter (humus), but this has less nitrogen in it than the surface layer.

Jadoo Fiber.

10003. Bought for experiment of the American Jadoo Fiber Co., Philadelphia. Cost, delivered, $1.10 for a package containing 24 pounds of the material.

This is claimed to be "a new growing substance for plants of all kinds," made by boiling peat moss or other suitable fibrous or spongy material with a fertilizing composition, straining and partially fermenting the product. Its manufacture is covered by patent.

The sample bought of the company had the following composition:

Water,	71.57 per cent.
Organic Matter,	25.82 "
Sand and Soil,	0.59 "
Soluble Mineral Matter,	2.02
	100 00

The material contained 0.29 per cent. of nitrogen, 0.18 per cent. of phosphoric acid, and .09 per cent. of potash.

REVIEW OF THE FERTILIZER MARKET,

For the Year ending October 31, 1898.

By E. H. Jenkins.

Nitrogen.

Nitric Nitrogen.

The *wholesale* New York quotation of nitrogen in this form in November, 1897, was 10.1 cents per pound. It rose at first gradually, and then sharply on account of the demand for the gunpowder manufacture and increased freight risks caused by the war, and was quoted in May, 1898, at 17.1 cents. It fell quickly thereafter to 9.1 cents in September, and rose in October to 9.6 cents per pound.

The average of the monthly quotations for a number of years — from November 1st to November 1st has been as follows:

Year,	1898	1897	1896	1895	1894	1893	1892	1891
Average quotation, Cents pr. lb., *wholesale*,	11.0	11.4	11.1	11.4	13.0	12.7	12.1	12.9

The *retail* price of nitrogen in nitrate in this state at freight centers, as shown on page 22, has been about 13.5 cents per pound.

Ammonic Nitrogen.

The *wholesale* New York quotations of nitrogen in form of sulphate of ammonia have ranged during the year between 10.9 cents and 12.6 cents per pound. The average of the monthly quotations has been 11.9 cents.

The corresponding averages of previous years have been:

Year,	1898	1897	1896	1895	1894	1893	1892
Average quotation, *wholesale*, cents per pound,	11.9	10.5	11.1	14.3	17.3	15.7	14.5

There is but little demand for sulphate of ammonia in the Connecticut retail market, and at *retail*, nitrogen in this form, as is seen on page 24, costs considerably more than nitrate, from 14.3 to 15.5 cents per pound.

Organic Nitrogen.

The *wholesale* New York quotations of nitrogen in the forms of red blood, black or low grade blood, and concentrated tankage for each month in the year are shown in the table on page 98. The fluctuations have not been large.

The nitrogen of red blood has cost at wholesale — the average of twelve months' quotations — 0.3 cent per pound more in 1898 than in 1897, that of black blood 0.2 cent more, and that of concentrated tankage 1.7 cents more.

These forms of organic nitrogen do not meet with much sale in our retail market.

Low grade tankage, fish, bone, and especially cotton-seed meal are the forms most used by those who mix their own fertilizers or apply fertilizers to their land unmixed.

Cotton-seed meal, as shown on page 25, has been the cheapest form of quickly-available organic nitrogen in our market.

Phosphatic Materials.

Rough bone, which was quoted at $17.50 per ton wholesale in the winter months of 1898, rose to $19 in June, at which price it has been quoted till November.

Bone meal was quoted November 1, 1898, at $21.50 per ton, a dollar more than in November of 1897.

Sulphuric acid, 66° B. rose from .97½ in November, 1897, to 1.47½ in May, 1898, and has been quoted at that figure till the time of this writing, November, 1898.

Available phosphoric acid, in form of dissolved South Carolina phosphate, quoted at 2.53 cents per pound wholesale in November, 1897, fell in April, 1898, to 2.36 cents, but has risen since then to 3.13 cents per pound.

The figures given on page 28 show that available phosphoric acid *in form of dissolved bone black* has cost *at retail* in this state from 6.0 to 6.9 cents per pound, while *in form of dissolved rock phosphate* it has cost from 3.1 to 4.6 cents per pound.

Potash.

Muriate of Potash.

The average monthly *wholesale* quotations of potash in this form have been 3.64 cents per pound, through the year, being fixed, like those of the other German potash salts, by the German Kali Works.

The retail price in Connecticut, as shown on page 31, has ranged from 3.8 to 4.5 cents per pound.

The Double Sulphate of Potash and Magnesia.

The average monthly wholesale quotation of potash in this form has been 4.09 cents per pound uniformly through the year.

The retail price of potash in this form in Connecticut, as appears on page 31, has ranged from 4.9 to 6.8 cents per pound.

High Grade Sulphate of Potash.

The average monthly wholesale quotation of potash in this form has been 4.10 cents per pound, uniformly through the year.

The retail price in Connecticut, as appears on page 31, has ranged from 4.6 to 5.1 cents per pound.

These quotations are taken from the "Oil, Paint, and Drug Reporter," published in New York. The weekly quotations for each month are averaged, and this average is taken as the quotation for the month.

The following explanations will help in the examination of the market quotations, and will also show the basis on which they have been interpreted in this review:

Phosphate rock, kainit, bone, fish-scrap, tankage, and some other articles, are usually quoted and sold by the ton. The seller usually has an analysis of his stock, and purchasers often control this by analysis at the time of the purchase.

Sulphate of ammonia, nitrate of soda, and the potash salts are quoted and sold by the pound, and generally their wholesale and retail rates do not differ very widely.

Blood, azotin, and concentrated tankage are quoted at so much "per unit of ammonia." To reduce ammonia to nitrogen, multiply the per cent. of ammonia by the decimal .824 (or multiply the per cent. of ammonia by 14 and divide that product by 17.) A "unit of ammonia" is one per cent., or 20 pounds per

ton. To illustrate: if a lot of tankage has 7.0 per cent. of nitrogen, equivalent to 8.5 per cent. of ammonia, it is said to contain $8\frac{1}{2}$ units of ammonia, and if quoted at $2.25 per unit, a ton of it will cost $8\frac{1}{2} \times 2.25 = \$19.13$.

The term "ammonia" is *properly* used only in those cases where the nitrogen actually exists in the form of ammonia, but it is a usage of the trade to reckon all nitrogen, in whatever form it occurs, as ammonia.

To facilitate finding the actual cost of nitrogen per pound from the cost per unit of ammonia in the market reports, the following table is given:

Ammonia	at	$3.00	per	unit	is equivalent to nitrogen at	18.2	cts. per lb.
"		2.90	"		" "	17.6	"
"		2.80	"		" "	17.0	"
"		2.70	"		" "	16.4	"
"		2.60	"		" "	15.8	"
"		2.50	"		" "	15.2	"
"		2.40	"		" "	14.6	"
"		2.30	"		" "	14.0	"
"		2.20	"		" "	13.4	"
"		2.10	"		" "	12.8	"
"		2.00	"		" "	12.2	"
"		1.90	"		" "	11.6	"
"		1.80	"		" "	11.0	"
"		1.70	"		" "	10.3	"
"		1.60	"		" "	9.7	"
"		1.50	"		" "	9.1	"

Commercial sulphate of ammonia contains about 20.8 per cent. of nitrogen, though it varies somewhat in quality. With that per cent. of nitrogen (equivalent to 25.25 per cent. of ammonia).

If quoted at		2.6	cents	per pound,	Nitrogen costs	12.5	cents per pound.
"		2.5	"		" "	12.0	"
"		2.4	"		" "	11.5	"
"		2.3	"		" "	11.1	"
"		2.2	"		" "	10.6	"
"		2.1	"		" "	10.1	"
"		2.0	"		" "	9.6	"

Commercial nitrate of soda averages 95 per cent. of pure sodium nitrate, or 16 per cent. of nitrogen.

If quoted at	2.5	cents per pound,	Nitrogen	costs	15.6 cents per pound.
"	2.4	"	"	"	15.0 "
"	2.3	"	"	"	14.4 "
"	2.2	"	"	"	13.8 "
"	2.1	"	"	"	13.2 "
"	2.0	"	"	"	12.5 "
"	1.9	"	"	"	11.9 "
"	1.8	"	"	"	11.3 "
"	1.7	"	"	"	10.6 "
"	1.6	"	"	"	10.0 "
"	1.5	"	"	"	9 4 "

Commercial Muriate of Potash usually contains 50½ per cent. of "actual potash," or potassium oxide.

If quoted at	2.20	cents per pound,	Potassium Oxide	costs	4.35 cents per lb.
"	2.15	"	"	"	4.25 "
"	2.10	"	"	"	4.15 "
"	2.05	"	"	"	4.06 "
"	2.00	"	"	"	3.96 "
"	1.95	"	"	"	3.86 "
"	1.90	"	"	"	3.76 "
"	1.85	"	"	"	3.66 "
"	1.80	"	"	"	3.56 "
"	1.75	"	"	"	3.46 "
"	1.70	"	"	"	3.36 "

High Grade Sulphate of Potash, as it is found in the Connecticut market, contains about 49.2 per cent. of actual potash.

If quoted at	2.50	cents per pound,	Potassium Oxide	costs	5.1 cents per lb.
"	2.45	"	"	"	5.0 "
"	2.40	"	"	"	4.9 "
"	2.35	"	"	"	4.8 "
"	2.30	"	"	"	4.7 "
"	2.25	"	"	"	4.6 "
"	2.20	"	"	"	4.5 "
"	2.15	"	"	"	4.4 "
"	2.10	"	"	"	4.3 "
"	2.05	"	"	"	4.2 "
"	2.00	"	"	"	4.1 "

The Double Sulphate of Potash and Magnesia has about 26½ per cent. of potassium oxide.

If quoted at	1.00	cents per pound,	Potassium Oxide costs	3.77	cents per lb.
"	1.05	"	"	3.96	"
"	1.10	"	"	4.15	"
"	1.15	"	"	4.34	"
"	1.20	"	"	4.53	"
"	1.25	"	"	4.72	"
"	1.30	"	"	4.90	"

The following table shows the fluctuations in the wholesale prices of a number of fertilizing materials in the New York market, since November, 1894. The price given for each month is the average of the four weekly quotations for that month. Sulphate of ammonia is assumed to contain 20.8 per cent. and nitrate of soda 16.0 per cent. of nitrogen, muriate of potash 50½ per cent., high grade sulphate 49.2 per cent., and double manure salt 26.5 per cent. of actual potash.

Wholesale Prices of Fertilizing Materials.

		Cost of Nitrogen at wholesale in						Cost of Potash at wholesale in			Available Phosphoric Acid in Dissolved South Carolina Rock. Cents per pound.
		Dried Blood.		Azotin or Ammonite. Cents per pound.	Concentrated Tankage. Cents per pound.	Nitrate of Soda. Cents per pound.	Sulphate of Ammonia. Cents per pound.	Muriate of Potash. Cents per pound.	Double Manure Salt. Cents per pound.	High Grade Sulphate of Potash. Cents per pound.	
		Red. Cents per pound.	Black or low grade. Cents per pound.								
	November,	14.1	13.1	14.0	12.3	13.2	16.4	4.13	5.04	4.85	3.00
	December,	13.5	12.4	13.1	12.3	12.9	16.0	4.13	5.04	4.85	3.10
1895.	January,	12.7	12.2	13.0	12.3	12.1	15.0	3.54	4.24	4.13	3.50
	February,	11.9	11.2	....	12.3	11.4	15.0	3.54	4.24	4.13	3.37
	March,	12.1	10.5	....	12.3	10.4	15.0	3.59	4.32	4.20	3.37
	April,	11.7	10.6	....	12.3	10.3	15.0	3 59	4 32	4 20	3.37
	May,	12.1	10.8	....	12.3	10.5	14.3	3.59	4.32	4.20	3.37
	June,	11.7	10.9	....	12.3	11.0	13.6	3.59	4.32	4.20	3.37
	July,	11.6	10.7	....	12.3	10.9	13.4	3.60	4.32	4.20	3.37
	August,	11.5	10.2	....	12.3	10.8	13.1	3.60	4.32	4.20	3.37
	September,	11.8	10.2	....	12.3	11.3	13.0	3 60	4.32	4.20	3.23
	October,	11.8	10.2	....	12.3	11.7	12.2	3.60	4.32	4.20	2.62
	November,	11.7	9.9	...	12.3	11.6	12.0	3.60	4.32	4.34	2.62
	December,	11.7	9.8	...	12.3	11.1	12.0	3.60	4.32	4.34	2.62
1896.	January,	11.0	9.8	....	12.3	10.8	11.6	3.60	4.32	4.34	2.62
	February,	10.8	9.8	....	12.3	10.7	11.3	3.55	3.99	4.13	2.62
	March,	10.8	9.8	....	12.3	10.7	11.5	3.53	3.87	4.05	2.73
	April,	10.8	9.8	....	12.3	10.7	11.1	3.60	3.94	4.10	2.73
	May,	10.7	9.9	....	12.3	10.9	10.8	3 60	3.94	4.10	2.73
	June,	10.5	9.8	....	12.3	10.8	10.8	3.60	3.94	4.10	2.73
	July,	10.5	9.8	....	12.6	10.8	10.8	3.60	3.94	4.10	2.73
	August,	10.5	9.8	....	11.4	10.8	10.7	3.60	3.94	4.10	2.73
	September,	10.2	9.1	....	9.5	10.8	10.5	3.60	3.94	4.10	2.73
	October,	10.3	9.0	....	9.5	11.3	10.5	3.60	3.94	4.10	2.73
	November,	11.0	10.1	....	9.4	11.6	10.8	3.59	3.94	4.10	2.73
	December,	11.2	10.8	....	9.5	12.1	10.4	3.59	3 94	4.10	2.73
1897.	January,	10.7	10.1	....	9.4	12.1	11.0	3.59	3.94	4.10	2.73
	February,	10 6	10.0	....	9.4	11.9	11.0	3.59	3.94	4.10	2.73
	March,	10.5	10.1	...	9.4	11.9	10.9	3.59	3.94	4.10	2.73
	April,	10.5	9.9	....	9.4	12.3	10.8	3.60	3.97	4.10	2.68
	May,	10.3	9.7	...	9.9	11.5	10.7	3.64	4.09	4.10	2.53
	June,	10.1	9.7	....	9 9	11.0	10.3	3.64	4.09	4.10	2.53
	July,	10.7	10.1	....	9.9	10.6	10.2	3.64	4.09	4.10	2.53
	August,	11.1	10.5	....	10.1	10.5	9.7	3.64	4.09	4.10	2.53
	September,	11.8	11.3	....	11.5	10.5	10.4	3.64	4.09	4.10	2.53
	October,	12.0	11.8	....	11.7	10.5	10.5	3.64	4.09	4.10	2.53
	November,	11.9	10.3	....	11.7	10.1	10.9	3.64	4.09	4.10	2.53
	December,	11.7	10.5	....	11.7	10.3	11.3	3.64	4.09	4.10	2.55
1898.	January,	11.7	10.5	....	11.7	11.3	11.5	3.64	4.09	4.10	2.53
	February,	11.6	10.4	....	11.6	10.3	12.4	3.64	4.09	4.10	2.48
	March,	10.0	10.2	....	11.4	11.1	12.1	3.64	4.09	4.10	2.36
	April,	10.8	10.5	....	11.5	11.9	11.4	3.64	4.09	4.10	2.36
	May,	10.9	10.6	....	11.7	17.1	11.5	3.64	4.09	4.10	2.50
	June,	11.1	10.8	....	11.7	11.5	12.1	3.64	4.09	4.10	2.56
	July,	10.8	10.3	....	11.7	9.9	12.1	3.64	4.09	4.10	3.13
	August,	10.8	10.5	....	11.7	9.2	12.3	3.64	4.09	4.10	3.13
	September,	10.8	10.5	....	11.7	9.1	12.6	3.64	4.09	4.10	3.13
	October,	10.8	10.5	....	11.7	9.6	12.3	3.64	4.09	4.10	3.13

ON THE PURCHASE OF FERTILIZERS.

By E. H. Jenkins.

The only rational way to buy fertilizers — or anything else — is for purchasers to *make their own schedule of valuation* immediately before purchasing, thus getting figures which are strictly correct for their special circumstances, and which enable them to compare accurately the different forms of plant food offered to them, with reference to their cost.

To illustrate: In the schedule of "trade values" given on page 17, soluble phosphoric acid is priced at 4½ cents, and reverted phosphoric acid at 4 cents — figures justified by the *average* prices of plain superphosphates for the half-year previous to making the schedule. But by getting quotations from a number of dealers and paying cash, certain farmers have, during the spring of 1898, bought available phosphoric acid in this form for 3.1 cents per pound. On the other hand, others have paid 6.8 cents per pound for it, in form of dissolved bone black.

There is no known difference between the two forms in respect to their value as plant food, and the buyer has paid in the one case more than twice as much for the same quantity of plant food as in the other.

If available phosphoric acid in form of unmixed goods costs 6 cents per pound, it may be cheaper for the buyer to get a factory mixture containing nitrogen, phosphoric acid, and potash. If he can get available phosphoric acid for three cents a pound it may pay him to do his own mixing, or better, perhaps, apply the chemicals unmixed.

The farmer goes into the market to buy plant food in forms which have a suitable mechanical condition and are available to crops, at as low a price as he can.

The mixed fertilizer has no special virtue in it because of its being a mixture. Whether the forms which contain the plant food are mixed before application or not is a circumstance which affects the cost of application or the cost of the ingredients, but does not affect the availability to crops of the plant food itself. Where fertilizers are applied broadcast it

may often be cheaper to apply each raw material separately than to buy them all in a ready-made mixture, or to prepare a mixture on the farm.

No general rule can be given, but the farmers in any community can yearly determine these things for themselves, by jointly securing quotations for mixed fertilizers and fertilizer chemicals from a number of manufacturers *before the spring work begins*, and by buying together.

There is no apparent reason why members of granges or other associations in one neighborhood should not more generally combine and secure from a number of manufacturers bids for a considerable number of tons, or of car lots even, of a fertilizer having a given guaranteed composition, made from certain specified raw materials, with a rebate provided for any failure to meet the guarantee, and at a specified cash price. This practice, which is quite common in other states and which has been adopted to a limited extent in Connecticut, with great advantage to the farmer, deserves more attention by those who prefer to buy mixed goods rather than raw materials.

At present in many of our towns a large number of brands, made by different firms, are sold in small lots to the members of the neighborhood at prices which are from 50 to 100 per cent. above the *cash ton price* of the real plant food contained in them.

If it is granted that this number of fertilizer agents is necessary, that each of the brands sold has a special merit for some particular crop, and if — as is too often the case — the seller must wait six or nine months for his pay, these prices are, perhaps, justified.

It is, however, quite certain that one, two, or three brands, at most, of concentrated mixed fertilizers containing the best forms of plant food — none of them so-called " cheap " fertilizers — would perfectly satisfy the agricultural needs of that community.

It is also certain that if this supply was made by one firm rather than by half a dozen different ones, the work of manufacture and sale could be more cheaply done.

Further, it is certain that if a number of firms made bids for doing the work, a still further reduction of cost to the farmer could be made; and, finally, if purchasers would not call on dealers or manufacturers to do a banking business for them, as well as a fertilizer business, by carrying their notes for three, six, or nine months, the cost of mixed fertilizers to the farmers

of this State would be considerably lessened and the profit of their use correspondingly increased.

The present condition of the trade is illustrated by the following facts:

In one town in this State there are forty farmers, each of whom uses a ton or more of commercial fertilizers, and in the aggregate between 300 to 400 tons are sold. There are eight distinct firms having selling agents there, but the number of brands sold is not known.

In another town there are about seventy farmers who use commercial fertilizers. There are three resident agents, and the goods made by eleven other manufacturers are also sold; the number of brands is considerably larger.

Another correspondent writes: "I know of only one agent in town. He only sells to accommodate his neighbors and to obtain what he uses at somewhere near reasonable cost. He pays cash and waits two years for his pay. He is a fool and he knows it. He is I."

THIRD

REPORT ON FOOD PRODUCTS.

To His Excellency, GEORGE E. LOUNSBURY, *Governor of Connecticut:*

As required by law, I herewith present the third annual report of this Station on Adulterated Food Products.

Very respectfully yours,

S. W. JOHNSON, *Director.*

THE CONNECTICUT FOOD LAW.

CHAPTER CCXXXV.

PUBLIC ACTS, JANUARY SESSION, 1895.

An Act regulating the Manufacture and Sale of Food Products.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. It shall be unlawful for any person, persons, or corporation within this State to manufacture for sale, offer, or expose for sale, have in his or their possession for sale, or to sell, any article of food which is adulterated or misbranded within the meaning of this act.

SEC. 2. The term food, as used in this act, shall include every article used for food or drink by man, horses, or cattle. The term misbranded, as used in this act, shall include every article of food and every article which enters into the composition of food, the package or label of which shall bear any statement purporting to name any ingredient or substance as not being contained in such article, which statement shall be untrue in any particular; or any statement purporting to name the substance or substances of which such article is made, which statement shall not give fully the names of all substances contained in such article in any measurable quantity.

SEC. 3. For the purposes of this act, an article shall be deemed adulterated:

First, if any substance or substances be mixed or packed with it so as to reduce or lower or injuriously affect its quality or strength;

Second, if any inferior substance or substances be substituted wholly or in part for the article;

Third, if any valuable constituent of the article has been wholly or in part abstracted;

Fourth, if it be an imitation of or sold under the name of another article;

Fifth, if it is colored, coated, polished, or powdered whereby damage is concealed, or if it is made to appear better or of greater value than it is;

Sixth, if it contains poisonous ingredients which may render such article injurious to the health of a party consuming it, or if it contain any antiseptic or preservative not evident and not known to the purchaser or consumer;

Seventh, if it consists, in whole or in part, of a diseased, filthy, decomposed, or putrid substance, either animal or vegetable, unfit for food, whether manufactured or not, or if it is in any part the product of a diseased animal, or of any animal that has died otherwise than by slaughter;

Provided, that an article of food product shall not be deemed adulterated or misbranded within the meaning of this act in the following cases.

(*a*) In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food under their own distinctive names, and not included in definition fourth of this section;

(*b*) In the case of articles labeled, branded, or tagged, so as plainly or correctly to show that they are mixtures, compounds, combinations, or blends;

(*c*) When any matter or ingredient is added to a food because the same is required for the protection or preparation thereof as an article of commerce in a fit state for carriage or consumption and not fraudulently to increase the bulk, weight, or measure of the food, or to conceal the inferior quality thereof;

(*d*) When a food is unavoidably mixed with some extraneous matter in the process of collection or preparation.

SEC. 4. The Connecticut Agricultural Experiment Station shall make analyses of food products on sale in Connecticut suspected of being adulterated, at such times and places and to such extent as it may determine, and may appoint such agent or agents as it deems necessary, who shall have free access, at all reasonable hours, for the purpose of examining into any place wherein it is suspected any article of food adulterated with any deleterious or foreign ingredient or ingredients exists, and such agent or agents upon tendering the market price of said article may take from any person, firm, or corporation samples of any article suspected of being adulterated as aforesaid, and the said station may adopt or fix standards of purity, quality, or strength when such standards are not specified or fixed by statute.

SEC. 5. Whenever said station shall find by its analysis that adul-

terated food products have been on sale in the State, it shall forthwith transmit the facts so found to a grand juror or prosecuting attorney of the town in which said adulterated food product was found.

SEC. 6. The said station shall make an annual report to the governor upon adulterated food products, in addition to the reports required by law, which shall not exceed one hundred and fifty pages, and said report may be included in the report which said station is already authorized by law to make, and such annual reports shall be submitted to the general assembly at its regular session.

SEC. 7. To carry out the provisions of this act, the additional sum of twenty-five hundred dollars is hereby annually appropriated to said Connecticut Agricultural Experiment Station, which sum shall be paid in equal quarterly installments to the treasurer of the board of control of said station, upon the order of the comptroller, who is hereby directed to draw his order for the same.

SEC. 8. Any person who, either by himself, his agent, or attorney, with the intent that the same may be sold as unadulterated, adulterates any food products for man, or horses, or cattle, or, knowing that the same has been adulterated, offers for sale or sells the same as unadulterated, or without disclosing or informing the purchaser that the same has been adulterated, shall be fined not more than five hundred dollars, or imprisoned not more than one year.

SEC. 9. No action shall be maintained in any court in this State on account of any sale or other contract made in violation of this act.

SEC. 10. All acts and parts of acts inconsistent herewith are hereby repealed.

Approved, June 26, 1895.

DUTIES OF THE STATION UNDER THE FOOD LAW.

The fourth, fifth, and sixth sections of the foregoing act lay certain duties upon this Station as follows:

1st. To make analyses of food products suspected of being adulterated.

2d. Whenever it shall find by its analysis that adulterated food products have been on sale, it shall forthwith transmit the facts so found to a prosecuting officer in the town where the adulterated food was found.

3d. The Station shall make an annual report.

The law also provides that the Station may adopt or fix standards of purity, quality, or strength, when such standards are not specified or fixed by statute.

SAMPLES COLLECTED BY THE STATION.

During the year beginning August 1, 1897, authorized agents of this Station visited twenty-eight towns and villages of this State and purchased samples of food products for examination at this Station.

These places were distributed as follows :

	No. of Places.
Litchfield County,	1
Hartford "	4
Windham "	3
Tolland "	0
New London "	4
Middlesex "	2
New Haven "	8
Fairfield "	6
	28

By this means there have been bought and examined 887 samples of the following names or kinds :

		No. of Samples.
Jelly,		70
Jam,		62
Tea,		89
Coffee,		73
Ginger,		91
Spices in boxes,	Pepper,	38
	Mustard,	26
	Red Pepper,	14
	Nutmeg,	6
	Cinnamon,	26
	Allspice,	21
	Cloves,	20
Tapioca, Sago, etc.,		4
Malt liquor,		47
Sausage,		19
Honey,		37
Maple syrup,		3
Milk,		109
Cream,		32
Canned soup,		32
Canned vegetables,		65
Chili sauce,		1
Mince meat,		9
Total,		894

In studying the chemical composition and microscopical characters of genuine spices from different localities, there have also been analyzed the following number of samples, most of them drawn from original packages in the possession of importers:

	No. of Samples.
Black pepper,	14
Pepper by-products and adulterants,	6
White pepper,	10
Cayenne pepper,	8
Ginger,	18
Ginger by-products,	3
Cloves,	8
Clove stems,	2
Ceylon cinnamon,	6
Cassia,	23
Cassia buds,	2
Allspice,	3
Nutmegs,	6
Mace,	7
Miscellaneous spice adulterants,	10
Total,	126

It has been our aim to collect as large a number of brands as possible of each of the food products examined, without trying to select the cheaper kinds, which are presumably more likely to be adulterated.

In every case where certain proof of adulteration was found, the facts, as required by the law, have been forthwith transmitted to a grand juror or other prosecuting officer of the town or borough where the adulterated food products were sold.

SAMPLES COLLECTED BY THE STATE DAIRY COMMISSIONER.

The office of Dairy Commissioner was established by an act of the General Assembly, approved April 3, 1886. By this and supplementary acts the commissioner is charged with the enforcement of laws regulating the sale of three articles, viz., butter, vinegar, and molasses.

From the beginning this station has done gratuitously all the chemical work desired by the commissioners, and has given expert testimony in court as required.

During the twelve months covered by this report there have been examined for the present commissioner, Hon. J. B. Noble, two hundred and three samples of molasses, thirty-two samples of vinegar, and seventeen samples of butter and imitation butter, making a total of two hundred and fifty-two.

It thus appears that, exclusive of cattle feeds, the station has examined during the past year twelve hundred and sixty-five samples of food products.

The results appear in detail in the following papers.

JELLIES.

By A. L. Winton, A. W. Ogden, and W. L. Mitchell.

Pure fruit jelly is a clear, gelatinous product made entirely from the fruit specified and cane sugar. Jellies which are offered for sale containing any other ingredients than these should be distinctly labeled as imitations or compounds in order to meet the requirements of the pure food law.

ADULTERANTS.

These may be classified as follows:

1. *Gelatinous Materials.*— Such as starch paste, gelatine, agar-agar, and apple jelly. Agar-agar is a general name for the gelatinous materials prepared in Japan, India, and other Eastern countries from sea-mosses. Like starch paste, it has little taste or color, and serves merely to stiffen the artificial jellies in which it is used. Apple jelly has a yellow color and a fruity flavor. By the admixture of dye stuffs and flavoring extracts it is readily transformed into counterfeit "currant jelly," "raspberry jelly," etc.

2. "*Sweeteners.*"— Glucose or corn syrup is commonly used because of its cheapness. It is much less sweet than cane sugar but is equally harmless. Saccharine, a sweetener prepared by chemical process from coal-tar, is now extensively advertised in the trade journals for use in food preparations. Although it costs about $15 per pound it can be profitably used in place of cane sugar, since it is about 500 times as sweet. Saccharine has no nutritive properties and in this respect differs from both cane sugar and glucose.

3. *Coloring Matters.*— Coal-tar, or "aniline," dyes (ma-

genta, tropeolin, Bordeaux B, etc.), cochineal, and possibly some vegetable dyes, are used in jellies. Some of the coal-tar colors have been shown to retard, in a marked degree, the process of digestion, and none of them, with our present knowledge, can be regarded as a fit ingredient for food. But, whether injurious or not, dyes serve to make jellies "appear better or of greater value" than they really are and therefore, according to the pure food law, are adulterants.

4. *Fruit Flavors.*— Artificial extracts, or fruit ethers, for flavoring jellies as well as soda water syrups and candies, are prepared by mixing ethers and other chemicals in various proportions. Although these mixtures are claimed to be chemically identical with the true fruit flavors, it usually requires a lively imagination to detect a resemblance, either in taste or odor.

5. *Acids.*— The acidity of jellies prepared from starch paste, agar-agar, and gelatine is secured by the addition of citric, tartaric, or other acids. Apple jelly is of course acid without any such admixture.

6. *Chemical Preservatives*— Salicylic acid is the common preservative for jellies. Possibly benzoic and sulphurous acids are also used.

EXAMINATION OF SAMPLES OF JELLY FROM THE CONNECTICUT MARKET.

Seventy samples have been examined which may be grouped as follows:

	Sold in bulk.	Sold in labeled packages.	Total.
Jellies not found adulterated,....	—	20	20
Adulterated jellies,.....	10	33	43
Jellies marked "compound," etc.,	—	7	7
			70

Methods of Examination.

Water. Into a flat-bottomed aluminum dish, 8 cm. in diameter, containing a glass stirring rod, both of which have been weighed together, are brought two grams of the jelly, ten grams of ignited sand and 50 cc. of water. The dish is then placed on the water bath and its contents stirred until the jelly has completely dissolved. The solution is evaporated to dryness, being stirred when the mass begins to stiffen to break up the

lumps and mix the sand. The dish and contents are then heated in a drying cell at 100° C. till the weight is constant.

By this method the drying is completed in nearly every case within fifteen hours, whereas in trials made without sand or without preliminary solution in water the jelly continued to lose in weight appreciably even after drying several days.

Ash is determined by burning below redness.

Nitrogen is determined by the Kjeldahl method.

Polarization, for the detection of glucose, is done as described on page 158.

Detection of Dyes.— A portion of the jelly is boiled with from one to three parts of water (according to the thickness of the jelly) until the lumps have disappeared. About 25 cc. of this jelly solution are made strongly alkaline with ammonia and shaken for some minutes with colorless amyl alcohol. Another portion is mixed with a few drops of hydrochloric acid and shaken in like manner with amyl alcohol. The clear alcohol layer is separated in both cases and examined for dyes.

If fuchsine is the only dye present the alcohol separated from the alkaline solution is colorless but acquires a magenta color on acidifying with acetic acid, addition of strong hydrochloric acid changes the color to yellow. If no appreciable amount of color is extracted from either the alkaline or the acid solution, further search for dyes is abandoned, but if in either case the alcohol extract is orange or red, or if addition of acetic acid develops a color, dyeing tests with wool are made.

The presence of a coal tar dye should not be affirmed until the color has been fixed on wool and the wool has been washed in boiling water, dried and tested according to the scheme of Witt and Weingaertner.*

In carrying out the dyeing tests the amyl alcohol solution is first evaporated to small volume in the presence of a thread of wool. If this treatment does not fix the color on the wool, water is added and the evaporation repeated. Some coal-tar colors are more readily taken up by wool from an aqueous than an alcoholic solution. The dye extracted from one sample examined did not dye wool at all until the amyl alcohol had been entirely removed by evaporation and the residue had been taken up in water.

A colored amyl alcohol does not prove the presence of a coal-tar color, as we have found that red coloring matters are extracted by this solvent from acid solutions of pure raspberry and grape jellies. These solutions, however, do not dye wool when treated as above described.

When the acid amyl alcohol extract has an orange color and coal-tar dyes are not found, test is made for cochineal by the uranium acetate method.† Cazeneuve's scheme for the detection of dyes‡ and the mercuric acetate methods of testing for acid fuchsine,§ which are so often em-

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*Girard et Dupré, Analyse des Matières Alimentaires et Recherche de leurs Falsification, pp. 583–593.

† Ibid, p. 580. ‡ Ibid, p. 174. § Ibid, p. 169.

ployed in the examination of wines, are not satisfactory in the case of jellies because filtration is difficult and the reactions often indecisive.

Particulars with regard to the kinds of jelly, the manufacturers, dealers, prices and (in the case of the adulterated and compound jellies) the materials, other than fruit and cane sugar detected, will be found in Tables I, II, and III. The results of the chemical analyses (which are of interest chiefly to food analysts) are given in Table IV.

Most of the pure jellies were made in the household, and all the adulterated samples were factory products. The adulterants detected were, starch paste, other gelatinous matter (probably apple jelly), glucose, magenta and other coal-tar dyes, cochineal and salicylic acid. Artificial fruit ethers were evidently present in many of the samples, but no tests other than taste and smell were applied. Gelatine was not in any case detected.

Some of the spurious jellies contained only one adulterant while in others not less than five adulterants were present.

Samples Nos. 9202 to 9206 inclusive are interesting frauds. Each was put up in a tumbler which was covered with a pasteboard cap labeled: "Pure fruit jellies, W. P. & Co.,* Ayer, Mass." The fruits from which they were supposed to be prepared, as given on other labels were orange, raspberry, strawberry, currant, and grape. These jellies were found to consist of starch paste sweetened with glucose, artificially flavored, colored (in all cases but one) with coal-tar dye and preserved with salicylic acid.

The prices of some of the adulterated jellies should be noted.

Samples Nos. 7898, 7899, 7900, and 9087 sold for 25 cents per jar or pail, containing in each case five pounds of jelly. The pure jellies, on the other hand, cost on the average 25 cents per half pound glass. Disregarding the value of the packages, the four imitations cost only one-tenth as much per pound as the genuine jellies.

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* In a monogram. The label on a sample of jam bore the same monogram with the firm name, "Whitcher, Pillman & Co."

TABLE I.—JELLIES NOT FOUND ADULTERATED.

Station No.	Brand.	Dealer.		Pounds of jelly in glass, jar, or pail.	Price. Cents.
	Apple.				
9245	Superior Apple Jelly, J. A. Thompson & Son, Melrose, Conn.,	*Hartford.*	Wm. C. Smith & Co., 119 Pearl St.,	5	60
	Barberry.				
9393	Barberry Jelly, Home Made, Mrs. S. C. Stone, New Haven,	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
	Crab Apple.				
9387	Crab Apple Jelly, Home Made, Mrs. S. C. Stone, New Haven,	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
9226	Pure Crab Apple Jelly, F. R. Adams & Co., Boston,		Johnson & Bro., 411 State St.,	½	25
	Currant.				
9362	Currant Jelly, made at the Station,				
9066	Red Currant Jelly, Austin Nichols & Co., N. Y.,	*Greenwich.*	Avery & Wilson,	⅔	25
9240	Currant Jelly, Francis H. Leggett & Co., N. Y.,	*Hartford.*	H. J. Case & Co., 433 Main St.,	½	25
9389	Currant Jelly, Home Made, Mrs. S. C. Stone, New Haven,	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
9227	Pure Red Currant Jelly, F. R. Adams & Co., Boston,		Johnson & Bro., 411 State St.,	½	25
9195	Pure Red Currant Jelly, Curtice Bros., Rochester, N. Y.,		Harry Leigh, 354 State St.,	½	25
9385	Currant Jelly, Home Made,		Woman's Exchange, 151 Orange St.,	½	35
9082	Red Currant Jelly, Gordon & Dilworth, N. Y.,	*Stamford.*	Fitch A. Hoyt, Atlantic Square,	½	30
	Grape.				
9386	Wild Grape Jelly, Home Made, Mrs. S. C. Stone, New Haven,	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35

9384	Grape Jelly, Home Made, ...	*New Haven.*	Woman's Exchange, 151 Orange St.,	½	25
	Pineapple.				
9388	Pineapple Jelly, Home Made, Mrs. S. C. Stone, New Haven, ...	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
	Plum.				
9390	Plum Jelly, Home Made, Mrs. S. C. Stone, New Haven, ...	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
	Quince.				
9392	Quince Jelly, Home Made, Mrs. S. C. Stone, New Haven, ...	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35
9311	Pure Fruit Jellies for Family Use, Quince, Steele Bros., New Britain, ...	*Norwich.*	Welcome A. Smith, 137 Main St., .	½	15
9313	Home Made Quince Jelly, R., . . .		A. T. Otis, 261 Main St., . . .	½	20
	Raspberry.				
9044	Raspberry Jelly, Home Made, Mrs. S. C. Stone, New Haven, ...	*Bridgeport.*	R. T. Whiting, 345 Main St., . .	⅔	35
	Strawberry.				
9391	Strawberry Jelly, Home Made, Mrs. S. C. Stone, New Haven, ...	*New Haven.*	Gilbert & Thompson, 918 Chapel St.,	⅔	35

TABLE II. ADULTERATED JELLIES. (NOT MADE ENTIRELY

Station No.	BRAND.	DEALER.
	Apple.	
9218	Extra Quality Apple Jelly. Made from select fruit,	*New Haven.*— New Haven Public Market, 390 State St.,
	Crab Apple.	
9237	Superior Crab Apple Jelly, American Preservers Co.,	*Hartford.*— Barrows & Thalheimer, 525 Main St.,
	Currant.	*Bridgeport.*—
9015	Currant Jelly. Sold in bulk,	Centennial Tea Co., 856 Main St.,
9023	Economy Currant Jelly, The W. Va. Preserving Co., Wheeling,	Coe & White, 560 Main St.,
9030	Currant Jelly. Sold in bulk,	David O'Donnell, 628 Main St.,
9013	do. do.	John T. Sullivan, 222 E. Main St.,
9029	do. do.	R. Wundrack, 575 Main St.,
9248	do. do.	*Meriden.*— Block & Behrens, 74 E. Main St.,
9338	do. do.	*Middletown.*— A. M. Bidwell, 344 Main St.,
9340	Excelsior Currant Jelly, New York,	W. K. Spencer, 98 Main St.,
9205	Currant Jelly, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*New Haven.*— S. S. Adams, 412 State St.,
9223	Currant Jelly. Sold in bulk,	do. do.
7898	Currant Jelly, The W. Va. Preserving Co , Wheeling,	Coe & Jenks, 422 State St.,
9186	Currant Jelly, Columbia Preserving Co., Boston,	Harry Leigh, 354 State St.,
9216	Extra Quality Currant Jelly. Made from select fruit,	New Haven Public Market, 390 State St.,
9301	Currant Jelly. Sold in bulk,	*Norwich.*— George Lepau, 252 Franklin St.,
9327	Fine Fruit Jellies, Currant, Oliver Day & Co., Boston,	*Putnam.*— W. J. Bartlett,
9080	Currant Jelly. Sold in bulk,	*Stamford.*— Fitch A. Hoyt,
9073	do. do.	T. F. Maher, 7 Pacific St.,
9087	Currant Jelly, Orange Preserving Co., N. Y.,	W. W. Edwards, 99 Main St.,
	Grape.	*Hartford.*—
9092	Grape Jelly,	J. C. & Co., Hill Grocery, 558 Asylum St.,
9206	Grape Jelly, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*New Haven.*— S. S. Adams, 412 State St.,
9185	Grape Jelly, Columbia Preserving Co., Boston,	Harry Leigh, 354 State St.,
	Guava.	
9234	Guava Jelly, E. T. Cowdrey & Co., Boston,	*Putnam.*— A. C. Stetson,
	Orange.	
9203	Orange, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*New Haven.*— S. S. Adams, 412 State St.,
	Peach.	
9255	Peach Jelly, Eagle Preserving Co., New York,	*Meriden.*— L. C. Brown, 4 E. Main St.,
9215	Extra Quality Peach Jelly. Made from select fruit,	*New Haven.*— New Haven Public Market, 390 State St.

FROM THE FRUIT SPECIFIED AND CANE SUGAR).

Pounds of jelly in glass, jar, or pail.	Price. Cents.	Gelatinous matter.	Sugar.	Coloring matter.	Preservative.
⅓	5	.....	Glucose,		
⅓	10	Starch paste,	Glucose,	....	Salicylic acid.
1	5	Starch paste,	Glucose,	Red coal-tar dye.	
½	10	....	Glucose,	.....	Salicylic acid.
1	5	Starch paste,	Glucose,	Magenta.	
1	5	Probably apple,	Glucose,	Red coal-tar dye.	
1	7	Starch paste,	Glucose,	Red coal-tar dye.	
1	5	Starch paste,	Glucose,	Magenta.	
1	10	Starch paste,	Glucose,	Magenta.	
½	15	Starch paste,	Glucose,	.....	Salicylic acid.
½	10	Starch paste,	Glucose,	Red coal-tar dye,	Salicylic acid.
1	5	Starch paste,	Glucose,	Magenta.	
5	25	Probably apple,	Glucose,	Magenta.	
⅔	10	Probably apple,	Glucose,	Magenta.	
⅓	5	Starch paste,	Glucose,	Magenta.	
1	5	Starch paste,	Glucose,	Red coal-tar dye.	
⅔	10	....	Glucose,	Red coal-tar dye.	
1	6	Starch paste,	Glucose,	Red coal-tar dye.	
1	8	Starch paste,	Glucose,	Orange coal-tar dye.	
5	23	Probably apple,	Glucose,		
¼	10	Starch paste,	Glucose,		
½	10	Starch paste,	Glucose,	Red coal-tar dye,	Salicylic acid.
⅔	10	Probably apple,	Glucose,	Magenta.	
½	20	.....	Glucose,		
½	10	Starch paste,	Glucose,	.....	Salicylic acid.
½	10	Starch paste,	Glucose,		
⅓	5	Starch paste,	Glucose,		

TABLE II. ADULTERATED JELLIES. (NOT MADE ENTIRELY

Station No.	BRAND.	DEALER.
	Pineapple.	
9280	Pineapple Jelly, Philip T. Ritter Conserve Co., Phila.,	*New London.*— Daboll & Freeman, 148 State St.,
9326	Pineapple Jelly, Berry Preserving Co., Boston,	*Putnam.*— W. H. Mansfield,
	Quince.	
9194	Curtice Pure Quince Jelly, Curtice Brothers, Rochester, N. Y.,	*New Haven.*— Harry Leigh, 354 State St.,
	Raspberry.	
9022	Raspberry Jelly, The Ayer Preserving Co., Ayer, Mass.,	*Bridgeport.*— Bridgeport Public Market, 39 Bank St.,
9204	Raspberry Jelly, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*New Haven.*— S. S. Adams, 412 State St.,
7899	Raspberry Jelly, The W. Va. Preserving Co., Wheeling,	Coe & Jenks, 422 State St.,
9308	Raspberry Jelly,	*Norwich.*— H. I. Palmer, 231 Main St.,
9070	Crystal Jelly, Raspberry, Extra Quality, New York,	*Stamford.*— Geo. A. Ferris, 184 Main St.,
	Strawberry.	
9241	Strawberry Jelly,	*Hartford.*— H. J. Case & Co., 433 Main St.,
9258	Strawberry Jelly, Eagle Preserving Co., 110 Hudson St., N. Y.,	*Meriden.*— H. F. Rudolf, 14 Pratt St.,
9352	Strawberry Jelly, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*Middletown.*— G. E. Burr, 136 Main St.,
9202	Strawberry Jelly, Pure Fruit Jellies, W. P. & Co., Ayer, Mass.,	*New Haven.*— S. S. Adams, 412 State St.,
7900	Strawberry Jelly, The W. Va. Preserving Co., Wheeling,	Coe & Jenks, 422 State St.,
9187	Strawberry Jelly, Columbia Preserving Co., Boston, Mass.,	Harry Leigh, 354 State St.,
9217	Extra Quality, Strawberry Jelly. Made from select fruit,	New Haven Public Market, 390 State St.,
9401	Strawberry Jelly, Whitcher, Pillman & Co., Ayer, Mass.,	N. A. Fullerton, 926 Chapel St.,

TABLE III.

9260	Fine Fruit Jellies, Currant, Compound, American Preserving Co., Phila.,	*Meriden.*— F. W. Miner, 213 Pratt St.,
9344	Currant Flavor, Pomona Jellies, made from the juice of fruit and refined sugar,	*Middletown.*— S. T. Camp, 234 Main St.,
9348	Peach Flavored Jelly, Williams Bros. & Charbonneau, Detroit, Mich.,	Cottage Market, cor. Main and Washington Streets,
9314	Clifford's Fruit Flavor Jellies, Strawberry,	*Norwich.*— T. A. Stoddard, 100 Franklin St.,
9315	Clifford's Fruit Flavor Jellies, Currant,	do. do.
9335	Crystal Currant Jelly, Compound,	*Putnam.*— A. C. Stetson,
9321	Currant Flavored Jelly, Williams Bros. and Charbonneau, Detroit, Mich.,	Edward Mullan,

FROM THE FRUIT SPECIFIED AND CANE SUGAR.)—*Continued.*

Pounds of jelly in glass, jar, or pail.	Price. Cents.	Gelatinous matter.	Sugar.	Coloring matter.	Preservative.
⅔	20	.....	Glucose.		
⅔	25	.....	Glucose.		
½	25	Quince,	Cane sugar,	Cochineal.	
5	25	Probably apple,	Glucose,	Red coal-tar dye.	
½	10	Starch paste,	Glucose,	Red coal-tar dye,	Salicylic acid.
5	25	Probably apple,	Glucose,	Magenta.	
½	15	Starch paste,	Glucose,	Red coal-tar dye.	
½	10	Probably apple,	Glucose,	.....	Salicylic acid.
½	10	.....	Glucose,	Coal-tar dye.	
5	30	Probably apple,	Glucose,		
½	15	Starch paste,	Glucose,	Red coal-tar dye.	
½	10	Starch paste,	Glucose,	Red coal-tar dye,	Salicylic acid.
5	25	Probably apple,	Glucose,	Magenta.	
⅔	10	Probably apple,	Glucose,	Magenta.	
⅓	5	Starch paste,	Glucose,	Magenta.	
½	10	Probably apple,	Glucose,	Red coal-tar dye,	Salicylic acid.

COMPOUND JELLIES.

⅔	10	Starch paste,	Glucose,	Red coal-tar dye,	Salicylic acid.
½	18	Starch paste,	Cane sugar,	Red coal-tar dye.	
½	10	Starch paste,	Glucose,		
⅓	10	Probably apple,	Glucose,	Orange coal-tar dye.	
⅓	10	Starch paste,	Glucose,		
5	30	Probably apple,	Glucose,		
⅔	15	Starch paste,	Glucose,		

TABLE IV. ANALYSES OF JELLIES.

Station No.		Water.	Ash.	Nitrogen.	Polarization. Sugar Degrees.				
					Direct.		After Inversion.		
					Reading.	Temp. C.	Reading.	Temp. C.	Reading at 86° C.
	Jellies not found adulterated.								
9245	Apple,	28.82	0.53	0.05	—34.6	21	—46.4	22	—16.0
9393	Barberry,	35.41	.25	.08	—10.0	25	—21.2	24	0.4
9387	Crab apple,	37.26	.53	.08	19.0	22	—19.0	23	— 0.2
9226	"	24.88	.21	.05	39.8	24	—22.0	24	— 1.0
9362	Currant,	26.81	.33	.04	—20.0	24	—22.4	22	0.0
9066	"	30.18	.32	.04	— 4.5	23	—22.0	21	0.0
9240	"	43.11	.75	.05	— 1.6	25	—17.6	24	— 0.2
9389	"	37.34	.33	.10	25.0	23	—19.2	23	0.4
9227	"	27.61	.54	.06	— 6.7	23	—23.1	22	0.0
9195	"	38.01	.79	.06	— 7.6	23	—20.4	25	— 0.6
9385	"	34.21	.29	.08	10.0	26	—19.6	25	2.2
9082	"	30.90	.65	.07	— 6.6	24	—20.0	24	0.0
9386	Grape,	36.04	.10	.05	27.4	22	—19.6	22	0.6
9384	"	29.20	.44	.07	41.6	23	—22.4	22	1.0
9388	Pineapple,	31.84	.26	.07	35.2	22	—22.0	24	— 0.4
9390	Plum,	36.29	.32	.08	24.0	24	—20.0	22	1.0
9392	Quince,	40.46	.16	.05	14.0	25	—18.6	23	— 0.4
9311	"	32.15	.12	.04	9.6	26	—19.6	24	0.0
9313	"	34.77	.28	.03	14.4	25	—19.6	23	0.0
9044	Raspberry,	24.38	.47	.11	19.3	21	—25.1	22	— 0.1
9391	Strawberry,	36.98	.20	.06	24.6	24	—19.2	24	1.6
	Adulterated Jellies.								
9218	Apple,	29.69	.39	.04	64.0	24	44.2	24	51.0
9237	Crab apple,	38.07	.52	.05	106.4	30	103.2	25	98.4
9015	Currant,	32.71	.68	.07	120.6	23	119.2	23	107.6
9023	"	31.62	.62	.05	77.8	26	75.6	23	76.4
9030	"	37.07	.63	.05	106.6	23	103.0	25	
9013	"	39.76	.85	.07	88.2	23	86.6	24	
9029	"	30.76	.82	.05	118.6	22	116.2	23	
9248	"	38.92	.63	.05	107.6	27	105.4	25	102.4
9338	"	40.32	.40	.06	116.2	25	114.2	23	108.2
9340	"	38.78	.52	.04	82.4	25	81.0	25	79.2
9205	"	38.78	.21	.05	104.8	25	93.0	25	91.4
9223	"	37.33	.45	.05	116.4	26	116.4	25	112.4
7898	"	32.63	.72	.05	115.3	22	103.7	21	103.7
9186	"	37.88	.65	.08	66.2	25	64.6	24	69.8
9216	"	38.47	.28	.05	49.8	26	31.8	27	39.4
9301	"	40.50	.70	.06	97.2	26	96.0	24	91.2
9327	"	39.36	.57	.06	85.4	25	67.0	25	71.4
9080	"	38.66	.67	.05	97.4	26	95.4	24	94.4
9073	"	29.70	.72	.05	115.6	24	114.0	23	
9087	"	30.25	.69	.06	123.0	21	120.6	21	
9092	Grape,	35.38	.48	.04	86.4	25	85.4	24	83.8
9206	"	39.38	....	.05	110.0	26	95.6	22	96.0
9185	"	35.16	.54	.05	72.8	25	69.8	23	75.0

TABLE IV. ANALYSES OF JELLIES.—*Continued.*

Station No.		Water.	Ash.	Nitrogen.	Polarization. Sugar Degrees.				
					Direct.		After Inversion.		
					Reading.	Temp. C.	Reading.	Temp. C.	Reading at 86° C.
	Adulterated Jellies.—Continued.								
9334	Guava, . . .	17.02	0.49	0.04	78.4	25	30.0	25	44.4
9203	Orange, . . .	37.60	.13	.04	118.4	25	105.4	24	104.4
9255	Peach, . . .	34.97	.50	.05	95.2	27	81.4	25	81.4
9215	" . . .	33.10	.60	.03	58.4	25	41.2	24	59.8
9280	Pineapple, . .	33.09	.32	.05	68.0	24	35.4	25	42.4
9326	" . . .	33.43	.73	.03	98.8	25	70.2	24	75.4
9194	Quince, . . .	31.68	.34	.03	21.4	22	— 1.2	24	7.0
9022	Raspberry, . .	36.71	.55	.05	106.0	22	103.2	25	
9204	" . . .	37.94	...	.07	110.0	24	95.2	24	94.4
7899	" . . .	31.37	.73	.05	122.5	23	118.5	23	
9308	" . . .	44.03	.51	.03	96.4	26	94.4	24	90.4
9070	" . . .	30.74	.43	.05	115.4	26	112.6	23	111.4
9241	Strawberry, . .	38.70	.69	.05	104.2	25	101.6	24	98.4
9258	" . . .	34.12	.57	.05	107.9	21	103.9	26	
9352	" . . .	30.31	.61	.07	99.4	25	88.8	23	91.4
9202	" . . .	36.31	....	.05	107.6	27	94.8	23	94.4
7900	" . . .	32.65	.73	.05	115.7	23	112.8	23	
9187	" . . .	35.15	.75	.07	70.4	25	64.4	24	69.4
9217	" . . .	36.41	.38	.04	57.2	25	29.2	25	38.6
9401	" . . .	38.76	.16	.05	102.0	25	94.0	25	90.0
	Compound Jellies.								
9260	. . . . .	22.79	.34	.05	85.4	25	64.4	25	72.0
9344	. . . . .	24.52	.18	.03	51.2	26	—22.8	24	0.0
9348	. . . . .	37.00	.52	.06	104.6	25	102.4	25	100.4
9314	. . . . .	37.32	.77	.03	53.8	25	52.4	24	58.4
9315	. . . . .	37.53	.50	.03	55.4	27	54.4	25	59.4
9335	. . . . .	30.57	.54	.05	121.1	23	118.7	24	
9321	. . . . .	32.97	.59	.06	115.4	25	114.6	23	110.0

PRESERVES, JAMS, MARMALADES, AND APPLE BUTTER.

By A. L. Winton, A. W. Ogden, and W. L. Mitchell.

Pure preserves, jams, and marmalades are products obtained by boiling down fruit with enough cane sugar to prevent fermentation. Unlike jellies, they contain the fruit pulp, and in the case of berries, currants, and some stone fruits, the seeds and skins. The presence of any other material than the fruit specified and *cane* sugar should be regarded as an adulteration, except in cases where the package is distinctly labeled so as to show that it is a "mixture, compound, combination, or blend."

Pure apple butter is a sauce made from apples, cane sugar, and spices. It should not contain glucose or chemical preservative.

Adulterants. — The materials mentioned in the chapter on jellies, page 108, are also used in the fruit products here considered. According to Blyth, jams may be readily adulterated with turnip pulp or other cheap vegetable tissue. It is stated that an artificial raspberry jam has been made in this country, in which herds-grass seed took the place of the fruit seeds. We have not, however, been able to detect foreign seeds in any of the samples examined at this station.

Examination of Samples from the Connecticut Market.

Eleven samples of pure preserves made at this station from fruit and cane sugar, and 51 samples of preserves, jams, marmalades, and apple butter bought by station agents from grocers in various parts of the state, have been examined by the methods described on page 109.

The samples prepared at the station were as follows:

No. 9405. — Blackberry jam.
9394. — Cherry jam.
9404. — Currant jam.
9399. — Orange marmalade.
9395. — Peach jam.
No. 9397. — Pineapple jam.
9396. — Plum jam.
9403 and 9364. — Quince jam.
9400. — Raspberry jam.
9398. — Strawberry jam.

The results of the analyses of these samples are given in Table VI, and may serve as standards of composition of pure fruit products.

The samples bought in the Connecticut market may be classified as follows:

Preserves, Jams, and Marmalades:	
Not found adulterated,	3
Adulterated (not made entirely from fruit and cane sugar),	44
Labeled "compound,"	2
Apple Butter:	
Not found adulterated,	1
Adulterated (not made entirely from apples, cane sugar, and spice),	1
Total,	51

Preserves, Jams, and Marmalades. — Of the 49 samples bought by station agents, only three were not found to contain other ingredients than fruit and cane sugar. The three were the following:

No. 9010. — Red Currant Jam. Specially prepared for R. C. Williams & Co., New York, by Charles Southwell & Co., London, Eng. Twenty cents per half-pound jar.

No. 9009. — Raspberry Jam. Specially prepared for R. C. Williams & Co., New York, by Charles Southwell & Co., London, Eng. Twenty cents per half-pound jar.

Nos. 9010 and 9009 were bought of George E. Cleaveland, 200 State Street, Bridgeport.

No. 9383. — Strawberry Jam. Home made. Bought at Woman's Exchange, 151 Orange Street, New Haven. Twenty cents per half-pound glass.

All the remaining 46 samples contained glucose; 27 were preserved with salicylic acid, eight were colored with coal-tar dyes, and four were colored with cochineal. The names of the manufacturers and dealers, the prices paid per jar, and the adulterants detected in the samples not labeled "compound" are given in Table V. The jars, unless otherwise noted, contained from one-half to two-thirds of a pound of the material.

TABLE V.—Adulterated Preserves, Jams, and Marmalades (Not Made Entirely from Fruit and Cane Sugar).

Station No.	Brand.	Dealer.	Price per jar or tin, cents.
	Blackberry.		
9032	Campbell's Blackberry Jam, Jos. Campbell Preserve Co., Camden, N. J.,	*Bridgeport.*— E. L. Sullivan, 436 E. Main st.,	18
7892	Superior Preserved Blackberries, Max Ams, New York,	*New Haven.*— D. S. Cooper Co., 470 State st.,	18
	Cherry.		
9190	Fresh Fruit, Red Cherry Jam, Curtice Bros. Co., Rochester, N. Y.,	*New Haven.*— Harry Leigh, 354 State st.,	15
	Currant and Raspberry.		
9243	Currant and Raspberry,	*Hartford.*— Joseph Hagerty, 75 Front st.,	10
9189	Fresh Fruit, Raspberry and Currant Jam, Curtice Brothers Co.,	*New Haven.*— Harry Leigh, 354 State st ,	15
	Damson.		
9196	Damson Jam, Pure Preserved Fruits, F. P. Adams & Co., Boston,	*New Haven.*— S. S. Adams, 412 State st.,	15
9278	Damson Jam, Alexander Cairns, Paisley, Scotland,	*New London.*— Daboll & Freeman, 148 State st.,	28
9075	Damson Jam, Crescent Preserve Co., Camden, N. J.,	*Stamford.*— T. F. Maher, 7 Pacific st.,	10
	Gooseberry.		
9275	Cairn's Finest Scotch Preserves, Gooseberry Jam, Paisley, Scotland,	*New London.*— Keefe & Davis, 125 Bank st.,	20
	Grape.		
7889	Superior Preserved Grapes, Max Ams, New York,	*New Haven.*— D. S. Cooper Co., 470 State st.,	18
	Orange.		
9192	Fresh Fruit Orange Marmalade, Curtice Bros. Co., Rochester, N.Y.,	*New Haven.*— Harry Leigh, 354 State st.,	15
	Peach.		
9036	Fresh Fruit Jam, Peach, W. H. Clark Co., Rochester, N. Y.,	*Bridgeport.*— Logan Bros., 863 Main st.,	15
9014	Peach Jam. Sold in bulk,	J. B. Sullivan, 222 E. Main st.,	8
9054	Fresh Fruit Peach Jam, Curtice Brothers Co ,	*Greenwich.*— J. L. Mahoney,	8
7888	Superior Preserved Peaches, Max Ams, New York,	*New Haven.*— D. S. Cooper Co., 470 State st.,	18
9289	McMechen's Old Virginia Peach Jam, Wheeling, W. Va.,	*New London.*— A. E. Foster, 120 Main st.,	18
9316	Peach Jam, Mrs. Hopkins' Delicious Jams, The E. G. Dailey Co., Detroit, Mich.,	*Putnam.*— J. E. Sullivan,	20
	Pineapple.		
9198	Grated Pineapple, F. P. Adams & Co., Boston,	*New Haven.*— S. S. Adams, 412 State st.,	15
9200	Pineapple Jam, F. P. Adams & Co., Boston,	S. S. Adams, 412 State st.,	15
7890	Superior Preserved Pineapples, Max Ams, New York,	D. S. Cooper Co., 470 State st.,	18
9193	Fresh Fruit Pineapple Marmalade, Curtice Bros Co., Rochester, N.Y.,	Harry Leigh, 354 State st	15

TABLE V.—Adulterated Preserves, Jams, and Marmalades (Not Made Entirely from Fruit and Cane Sugar).—*Continued.*

Station No.	Brand.	Sugar.	Coloring Matter.	Preservative.
	Blackberry.			
9032	Campbell's Blackberry Jam, Jos Campbell Preserve Co., Camden, N. J.,	Glucose	Red coal-tar dye	
7892	Superior Preserved Blackberries, Max Ams, New York,	Glucose	Red coal-tar dye	
	Cherry.			
9190	Fresh Fruit, Red Cherry Jam, Curtice Bros. Co., Rochester, N. Y.,	Glucose	Cochineal	Salicylic acid
	Currant and Raspberry.			
9243	Currant and Raspberry,	Glucose		
9189	Fresh Fruit, Raspberry and Currant Jam, Curtice Brothers Co.,	Glucose	.....	Salicylic acid
	Damson.			
9196	Damson Jam, Pure Preserved Fruits, F. P. Adams & Co., Boston,	Glucose	.....	Salicylic acid
9278	Damson Jam, Alexander Cairns, Paisley, Scotland,	Glucose		
9075	Damson Jam, Crescent Preserve Co., Camden, N. J.,	Glucose		
	Gooseberry.			
9275	Cairn's Finest Scotch Preserves, Gooseberry Jam, Paisley, Scotland,	Glucose		
	Grape.			
7889	Superior Preserved Grapes, Max Ams, New York,	Glucose		
	Orange.			
9192	Fresh Fruit Orange Marmalade, Curtice Bros. Co., Rochester, N.Y.,	Glucose	.....	Salicylic acid
	Peach.			
9036	Fresh Fruit Jam, Peach, W. H. Clark Co., Rochester, N. Y.,	Glucose		
9014	Peach Jam. Sold in bulk.	Glucose	.....	Salicylic acid
9054	Fresh Fruit Peach Jam, Curtice Brothers Co.,	Glucose	.....	Salicylic acid
7888	Superior Preserved Peaches, Max Ams, New York,	Glucose	.....	Salicylic acid
9289	McMechen's Old Virginia Peach Jam, Wheeling, W. Va.,	Glucose	.....	Salicylic acid
9316	Peach Jam, Mrs Hopkins' Delicious Jams, The E. G. Dailey Co., Detroit, Mich.,	Glucose		
	Pineapple.			
9198	Grated Pineapple, F. P. Adams & Co., Boston,	Glucose	.....	Salicylic acid
9200	Pineapple Jam, F. P. Adams & Co., Boston,	Glucose	.....	Salicylic acid
7890	Superior Preserved Pineapples, Max Ams, New York,	Glucose	.....	Salicylic acid
9193	Fresh Fruit Pineapple Marmalade, Curtice Bros. Co., Rochester, N.Y.,	Glucose	.....	Salicylic acid

TABLE V.—Adulterated Preserves, Jams, and Marmalades (Not Made Entirely from Fruit and Cane Sugar).—*Continued.*

Station No.	Brand.	Dealer.	Price per jar or tin, cents.
	Quince.		
9042	Fort Henry Preserves, Quince, The W. Va. Pres'g Co., Wheeling,	*Bridgeport.*— C. H. Stevens, 398 E. Main st.,	12
9031	Campbell's Quince Jam, Jos. Campbell Preserve Co., Camden, N. J.,	E. L. Sullivan, 436 E. Main st.,	18
7891	Superior Preserved Quinces, Max Ams, New York,	*New Haven.*— D. S. Cooper Co., 470 State st.,	18
9188	Fresh Fruit Quince Jam, Curtice Bros. Co., Rochester, N. Y.,	Harry Leigh, 354 State st.,	15
	Raspberry.		
9263	Raspberries,	*Meriden.*— C. F. Fox, 90 W. Main st.,	12
9350	Fruit Jams, Raspberry, The E. G. Dailey Co., Detroit, Mich.,	*Middletown.*— W. F. Mackley, Main st.,	15
9343	Pillman's Pure Preserved Fruits, Wild Raspberry, Whitcher, Pillman & Co., Ayer, Mass.,	J. B. Patterson, 110 Main st.,	15
9197	Wlld Raspberries, F. P. Adams & Co., Boston,	*New Haven.*— S. S. Adams, 412 State st.,	15
7893	Superior Preserved Raspberries, Max Ams, New York,	D. S. Cooper Co., 470 State st.,	18
9224	Thomas Wood's Kentish Farm House Jams, Raspberry, Swanley, Eng.,	Johnson Bros., 411 State st.,	18
9408	Home-made Preserves, Raspberry, H. A. Johnson & Co., Boston,	D. M. Welch & Son, 28 Cong. av.,	50*
9290	Anderson's Raspberry Jam, Anderson Preserving Co., Camden, N. J.,	*New London.*— A. E. Foster, 120 Main st.,	12
	Strawberry.		
9037	Fresh Fruit Jam, Strawberry, W. H. Clark & Co., Rochester, N. Y.,	*Bridgeport.*— Logan Bros., 863 Main st.,	15
9053	Strawberry Jam, Crescent Preserve Co., Camden, N. J.,	*Greenwich.*— J. L. Mahoney,	8
9091	Health Brand Jams, Strawberry, Lewis DeGroff & Son, N. Y.,	*Hartford.*— J. F. Morrissey, 84 Albany ave.,	18
9356	Strawberry, Los Angeles Brand, E. M. Potts & Co.,	*Middletown.*— D. I. Chapman, 146 Main st.,	25
9199	Wild Strawberries, F. P. Adams & Co., Boston,	*New Haven.*— S. S. Adams, 412 State st.,	15
9191	Fresh Fruit Strawberry Jam, Curtice Bros. Co., Rochester, N. Y.,	Harry Leigh, 354 State st.,	15
9225	Thomas Wood's Kentish Farm House Jams, Strawberry, Swanley, Eng.,	Johnson Bros., 411 State st.,	18
9279	Strawberry Jam, Batty & Co., London,	*New London.*— Daboll & Freeman, 148 State st.,	28
9319	Strawberry, Daniels, Cornell & Co., Worcester, Mass.,	*Putnam.*— J. E. Sullivan,	10
9079	Strawberry Jam, Williams Bros. & Charbonneau, Detroit, Mich.,	*Stamford.*— Geo. A. Ferris, 184 Main st.,	20
	Tomato.		
9355	Fresh Fruit Jam, Tomatoes, Flaccus Bros., Wheeling, W. Va.,	*Middletown.*— D. I. Chapman, 146 Main st.,	18

* 5 pound jar.

TABLE V.—ADULTERATED PRESERVES, JAMS, AND MARMALADES (NOT MADE ENTIRELY FROM FRUIT AND CANE SUGAR).—*Continued.*

Station No.	Brand.	Sugar.	Coloring Matter.	Preservative.
	Quince.			
9042	Fort Henry Preserves, Quince, The W. Va. Pres'g Co., Wheeling,	Glucose		
9031	Campbell's Quince Jam, Jos. Campbell Preserve Co., Camden, N. J.,	Glucose	Red coal-tar dye	
7891	Superior Preserved Quinces, Max Ams, New York, . . .	Glucose	.....	Salicylic acid
9188	Fresh Fruit Quince Jam, Curtice Bros. Co., Rochester, N. Y., .	Glucose	Cochineal	Salicylic acid
	Raspberry.			
9263	Raspberries, ...	Glucose		
9350	Fruit Jams, Raspberry, The E. G. Dailey Co., Detroit, Mich., .	Glucose		
9343	Pillman's Pure Preserved Fruits, Wild Raspberry, Whitcher, Pillman & Co., Ayer, Mass., ...	Glucose	Red coal-tar dye	Salicylic acid
9197	Wild Raspberries, F. P. Adams & Co., Boston, ...	Glucose	.....	Salicylic acid
7893	Superior Preserved Raspberries, Max Ams, New York, . .	Glucose	Red coal-tar dye	Salicylic acid
9224	Thomas Wood's Kentish Farm House Jams, Raspberry, Swanley, Eng., ...	Glucose		
9408	Home-made Preserves, Raspberry, H. A. Johnson & Co., Boston,	Glucose	Red coal-tar dye	Salicylic acid
9290	Anderson's Raspberry Jam, Anderson Perserving Co., Camden, N. J.,	Glucose		
	Strawberry.			
9037	Fresh Fruit Jam, Strawberry, W. H. Clark & Co., Rochester, N. Y.,	Glucose	.....	Salicylic acid
9053	Strawberry Jam, Crescent Preserve Co., Camden, N. J., . .	Glucose		
9091	Health Brand Jams, Strawberry, Lewis DeGroff & Son, N. Y., .	Glucose	.....	Salicylic acid
9356	Strawberry, Los Angeles Brand, E. M. Potts & Co., . . .	Glucose	Cochineal	Salicylic acid
9199	Wild Strawberries, F. P. Adams & Co., Boston, ...	Glucose	.....	Salicylic acid
9191	Fresh Fruit Strawberry Jam, Curtice Bros. Co., Rochester, N. Y.,	Glucose	Cochineal	Salicylic acid
9225	Thomas Wood's Kentish Farm House Jams, Strawberry, Swanley, Eng., ...	Glucose		
9279	Strawberry Jam, Batty & Co., London, ...	Glucose		
9319	Strawberry, Daniels, Cornell & Co., Worcester, Mass., . .	Glucose	.....	Salicylic acid
9079	Strawberry Jam, Williams Bros. & Charbonneau, Detroit, Mich.,	Glucose		
	Tomato.			
9355	Fresh Fruit Jam, Tomatoes, Flaccus Bros., Wheeling, W. Va., .	Cane sugar	.....	Salicylic acid

Two pails of preserves made by the Central Preserving Co., 201 State Street, Boston; one (No. 9407) labeled "Raspberry Jam, Compound," the other (No. 9406), "Strawberry Preserve Compound," were bought of D. M. Welch & Son, 28 Congress Avenue, New Haven. Each of the pails contained about five pounds of the preserve, and cost 35 cents.

The following statement of composition was attached to each package:

COMPOUND PRESERVES MADE FROM

Fresh Fruit,	.250
Corn Syrup,	.300
Gran. Sugar,	.250
Fruit Juice,	.200
	1.000

In addition to the materials above mentioned, both samples were found to contain a red coal-tar dye and salicylic acid.

Apple Butter.— Two samples were examined:

No. 9299. Heinz's Apple Butter, H. J. Heinz Co., Pittsburg. Dealer, A. T. Otis, 261 Main Street, Norwich. Price, 25 cts. per 2-pound pail. Contained neither glucose nor salicylic acid.

No. 9300. Apple Butter, West Virginia Preserving Co., Wheeling, W. Va. Dealer, J. A. Stoddard, 100 Franklin St., Norwich. Price, 25 cts. per 2-pound jar. This sample was sweetened with glucose and preserved with salicylic acid.

TABLE VI. ANALYSES OF PRESERVES, JAMS, MARMALADES, AND APPLE BUTTER.

Station No.	*Preserves, Jams, and Marmalades, not found adulterated.*	Water.	Ash.	Nitrogen.	Polarization. Direct. Reading.	Direct. Temp. c.	After Inversion. Reading.	After Inversion. Temp. c.	Reading at 86° c.
9405	Blackberry,	26.41	.60	.19	−4.6	26	−20.0	23	1.0
9394	Cherry,	25.21	.38	.10	4.0	25	−20.0	25	1.2
9404	Currant,	27.38	.45	.20	−6.6	25	−21.8	23	0.8
9010	do	27.15	.50	.12	−16.5	26	−23.3	23	−2.2
9399	Orange,	34.57	.52	.10	4.2	25	−16.2	26	1.0
9395	Peach,	33.73	.41	.06	19.8	26	−19.6	21	0.4
9397	Pineapple,	29.82	.38	.10	21.4	25	−20.4	24	0.5
9396	Plum,*	31.66	.39	.12	6.4	25	−16.2	25	3.0
9403	Quince,	26.85	.23	.05	32.6	26	−21.8	23	0.3
9364	do	17.74	.20	.04	8.2	23	−23.6	23	0.0
9400	Raspberry,	27.99	.33	.15	35.6	25	−19.4	25	0.8
9009	do	26.46	.34	.16	4.8	25	−20.2	24	0.0
9398	Strawberry,	26.50	.65	.18	20.0	22	−22.4	23	−0.2
9383	do	24.90	.73	.16	−15.0	23	−20 0	22	1.4
	Adulterated Preserves, Jams, and Marmalades.								
9032	Blackberry,	30.71	.42	.08	78.0	24	48.0	24	55.0
7892	do	32.50	.59	.11	86.0	25	74.6	24	75.0
9190	Red Cherry,	31.44	.58	.06	38.0	27	19.8	22	31.0
9243	Currant & raspberry,	28.05	.58	.06	110.6	26	108.0	24	98.6
9189	do	35.68	.41	.12	40.8	26	20.0	23	31.4
9196	Damson,†	33.91	.50	.10	22.6	26	7.8	25	21.4
9278	do‡	31.36	.33	.05	12.8	24	1.0	22	16.0
9075	do	33.70	.62	.08	100.8	24	94.0	25	91.0
9275	Gooseberry,	34.37	.50	.08	21.6	25	8.0	23	21.0
7889	Grape,	31.76	.57	.06	72.8	25	72.0	22	66.8
9192	Orange,	25.12	.27	.05	48.8	25	21.0	23	26.8
9036	Peach,	37.72	.48	.06	61.2	26	28.6	24	37.2
9014	do	30.30	.64	.16	92.5	24	76.1	23	76.1
9054	do	34.91	.38	.07	42.4	23	16.8	22	29.2
7888	do	44.44	.29	.08	43.2	26	9.6	22	21.0

* Pits and skins constituting 9.8 per cent. of the original jam were rejected.

† " " " 10.6 " " " " "

‡ " " " 14.7 " " " " "

TABLE VI. ANALYSES OF PRESERVES, JAMS, MARMALADES, AND APPLE BUTTER.— *Continued.*

Station No.		Water.	Ash.	Nitrogen.	Polarization.				
					Direct.		After Inversion.		
					Reading.	Temp. c.	Reading.	Temp. c.	Reading at 86° c.
9289	Peach (*Cont.*),	20.88	.31	.08	60.0	25	47.0	23	57.0
9316	do	31.04	.46	.06	79.2	26	59.0	25	63.6
9198	Pineapple,	23.99	.19	.07	73.4	24	39.4	23	50.0
9200	do	23.89	.20	.06	82.6	25	46.6	22	56.2
7890	do	50.44	.19	.05	36.6	27	12.0	22	20.6
9193	do	31.61	.29	.03	53.2	28	18.0	26	32.0
9042	Quince,	36.94	.63	.04	89.0	24	82.0	24	82.6
9031	do	32.71	.29	.04	74.0	24	43.0	22	50.4
7891	do	41.87	.22	.05	32.4	24	10.4	21	23.0
9188	do	37.92	.36	.05	37.0	26	18.8	24	30.0
9263	Raspberry,	34.43	.50	.07	97.0	27	86.4	25	84.0
9350	do	37.27	.62	.15	68.4	25	62.0	23	65.0
9343	do	24.75	.48	.10	74.8	27	66.6	25	70.0
9197	do	26.01	.38	.09	52.0	26	42.4	25	51.2
7893	do	27.06	.48	.07	89.0	26	77.4	23	80.0
9224	do	26.41	.47	.16	45.6	26	9.6	25	22.8
9408	do	31.90	.58	.10	97.8	26	92.0	23	88.4
9290	do	31.14	.50	.07	14.8	23	7.0	21	22.4
9037	Strawberry,	34.60	.42	.09	50.6	25	36.4	20	45.4
9053	do	25.25	.74	.07	88.4	24	84.0	25	84.0
9091	do	26.21	.67	.08	77.0	27	66.0	22	71.2
9356	do	24.00	.68	.11	57.0	25	18.8	23	33.8
9199	do	26.56	.55	.08	61.2	26	37.8	24	47.0
9191	do	30.05	.41	.09	38.8	25	15.8	23	30.4
9225	do	21.09	.46	.12	60.0	26	20.0	26	35.0
9279	do	22.58	.40	.07	37.8	25	2.6	22	20.0
9319	do	23.91	.57	.09	110.4	25	106.2	24	105.0
9079	do	34.75	.35	.07	64.0	27	56.4	22	60.0
9355	Tomato,	37.18	.53	.18	11.6	26	−19.0	22	0.0
	Compounds.								
9407	Raspberry,	31.12	.24	.10	83.5	26	64.0	23	67.4
9406	Strawberry,	35.68	.71	.06	80.4	26	62.4	25	66.0
9299	Apple Butter,	53.21	.47	.08	−14.0	23	−15.2	23	−1.4
9300	do	49.96	.76	.08	41.0	23	39.2	22	42.0

TEA.

By A. L. Winton, A. W. Ogden, and W. L. Mitchell.

Tea is prepared from the leaves of a shrubby plant, *Camellia Thea*, Link, of which there are two quite distinct varieties, considered by some botanists to be separate species. Botanically, the plant is closely related to the camellias of the conservatories.

It is stated that the tea plant has been cultivated in China for at least a thousand years, and in Japan since the beginning of the thirteenth century. It has been introduced into India, Ceylon, Java, Brazil, and some other countries during the present century. China and Japan are still the leading tea producing countries, although teas from India and Ceylon are now coming into extensive use.

Both green and black tea are products of the same plant, the difference in color and flavor being due to the method of preparation. To prepare "green tea" the leaves are dried by artificial heat immediately after picking, thus preserving the chlorophyl, or green coloring matter. When a "black tea" is desired, the leaves are subjected, before drying, to a fermentation, which changes their color to black and develops the characteristic flavor.

The alkaloid of tea, formerly known as "thein," has been shown to be identical with that of coffee, "caffein," and to this principle are attributed the stimulating properties of both beverages.

The imports of tea into the United States for the year ending June 30, 1896, amounted to 93,891,407 pounds, having an import cargo value at 14 cents per pound, of $12,688,739.61.

Adulteration of Tea.

The foreign materials with which tea has been most often adulterated fall into the following classes :

Mineral Make-Weights.—Such as soapstone, gypsum, iron dust, sand, etc.

Lie Tea.—The trade name of an adulterant consisting of tea dust and other matters made into lumps with starch paste and colored. The lumps go to pieces on treatment with hot water.

Exhausted Leaves.— Tea leaves which have been used for the preparation of the beverage are said to be collected from door to door in China and also in England, and after being dried and restored, as far as possible, to their original appearance are employed for purposes of adulteration.

Foreign Leaves.— Leaves of various plants, as, for example, the beach, willow, elm, rose, wistaria, etc., have frequently been prepared in imitation of tea and mixed with the genuine leaf. This form of adulteration is usually evident to any careful observer, after spreading out the leaves, which have been rendered pliable by treatment with boiling water.

Astringents.— Catechu and some other materials, rich in tannin, were at one time used to give tea artificial strength.

Facing.— Nearly all the green tea and much of the black tea brought into the United States has been "faced" or coated, to impart a gloss and an attractive color. Among the materials employed in facing green tea are Prussian blue, indigo, turmeric, soapstone, and gypsum. Black tea is frequently coated with plumbago or black lead.

As these materials in the quantities employed may not be injurious to health and usually do not perceptibly increase the weight of the tea, it is a disputed question whether they should be regarded as adulterants. Facing is, however, a senseless custom, and when it is generally understood that it increases the cost of production without in any way adding to the value of the tea for the preparation of the beverage, the practice will doubtless be abandoned.

Tea Legislation.

The U. S. Tea Adulteration Act of 1883.— *Battershall states that "the enactment of this law was largely due to the exertions of prominent tea merchants whose business interests were seriously affected by the sale (principally in trade auctions) of the debased or spurious article."

The law prohibited the importation of tea adulterated with spurious or exhausted leaf, or with so great an admixture of chemicals, or other deleterious substances, as to make it unfit for use. It provided that for each consignment of tea the importer should give a bond to the collector of the port that it

* Food Adulteration and Its Detection, p. 19.

should not be removed from warehouse until released by the custom house officials. Whenever the tea was found, on examination, to come within the prohibitions of the act, the importer was required to give a bond to ship it outside the limits of the country within six months. If this was not done at the expiration of the time specified the tea was destroyed.

As a result of the rigid enforcement of this law, the quality of the tea imported has considerably improved.

The U. S. Act of 1897 to Prevent the Importation of Impure and Unwholesome Tea.— The act of 1883 was repealed in 1897 and a more comprehensive law enacted, which makes it unlawful to import not only adulterated tea, but any that is inferior in purity, quality, or fitness for consumption.

Under this law the secretary of the treasury is required to appoint each year a board of seven tea experts, whose duty it is to fix standards for all the kinds of tea imported and procure samples of standard tea for deposit at the custom houses at New York, Chicago, and San Francisco, and for distribution among tea importers. All tea imported must be compared with these standards by the proper officials, and if found inferior, must be either exported out of the country within six months or destroyed.

Japanese Tea Adulteration Law.— In 1884, the Japanese Government passed a law making it a criminal offense to adulterate tea. Facing is not, however, prohibited as it is claimed that it is justified by the demands of foreign trade.

Examination of Samples from the Connecticut Market.

During the month of October, 1897, agents of the station purchased, in various parts of the State, 26 samples of green tea, 53 of black tea, and 10 of mixed tea, all of which have been examined. The results of the examinations, with such particulars as could be obtained regarding the kinds of tea, the names and addresses of dealers, and the prices paid per pound, are given in following tables.

METHODS OF EXAMINATION.

Foreign Leaves.— A sample of the tea is boiled with water, and the shape venation, dentation, and microscopic characters of the moist leaves are noted.

Water is determined by drying two grams to constant weight at 100° C.

Total Ash is determined by incinerating two grams by the usual method.

Ash Insoluble in Water.— The ash prepared as above is boiled with 50 cc. of water and the insoluble portion collected on a Gooch crucible, washed with hot water, dried and ignited.

Ash Soluble in Water is obtained by subtracting the percentage of water-insoluble from the percentage of total ash.

Hot Water Extract.— Two grams of the unground tea are boiled with 200 cc. of water for a half hour, care being taken to replace the water lost by evaporation. The leaves are collected on a tared filter, washed thoroughly with boiling water, dried at 100° C. and weighed.

The sum of the percentages of insoluble leaf and of water, subtracted from 100 per cent., gives the percentage of hot water extract.

The percentages of total and water-insoluble ash show whether or not the tea contains an undue amount of sand or mineral make-weights, and the percentages of hot water extract and water-soluble ash indicate whether or not there is any considerable amount of exhausted leaves. The ocular examination with and without the microscope detects any admixture of foreign leaves.

DISCUSSION OF ANALYSES.

The results of the analyses of tea are given in the table on pages 136 and 137.

The average percentages found in these analyses are as follows:

	No. of Analyses.	Water.	Total Ash.	Water-soluble Ash.	Water-insoluble Ash.	Hot water Extract.
Green tea,	26	5.18	7.16	3.61	3.54	37.41
Black "	53	5.94	6.27	3.58	2.69	36.23
Mixed "	10	6.16	6.72	3.72	3.00	34.35

The range in the percentage amount of ash and of extract, as determined by our analyses, is as follows:

	Green Tea.	Black Tea.
Total Ash,	6.13 to 8.39	5.57 to 7.42
Soluble Ash,	2.80 to 4.01	2.87 to 4 75
Insoluble Ash,	2.25 to 5.59	1.94 to 3.82
Extract,	30.82 to 40.08	28.48 to 44.92

From the analyses of tea made elsewhere and the standard adopted in other countries, it would appear that genuine tea should contain not more than 8 per cent. of total ash nor less than 3 per cent. of soluble ash nor less than 30 per cent. of extract.

Of the samples examined at this Station during the past twelve months, four (all of them green teas) contained more than eight per cent. of ash. This may indicate the presence of some adhering dirt or facing, but in no case was the percentage high enough to show that mineral make-weights had been added.

TABLE VII. TEA NOT FOUND ADULTERATED.

Station No.	Brand.	Dealer.	Price per pound.
7784	*Green Tea*,	*Bridgeport.* The Carten Tea Co., 529 Main St.,	$0.40
7790	"	E. H. Davis, 60 Courtland St.,	.52
7795	"	C. H. Stevens, 398 E. Main St.,	.26
7778	"	Union Pacific Tea Co., 416 Main St.,	.26
9159	"	*Danbury.* Atlantic & Pacific Tea Co., 163 Main St.,	.28
7773	"	*Derby.* Grand Union Tea Co., 237 Main St.,	.40
7934	"	*Hartford.* Grand Union Tea Co., 249 Main St.,	.36
7951	"	Leroy Bros., 691 Main St.,	.40
7932	"	*Meriden.* Grant's Tea Store, State and Main Sts.,	.30
7930	"	Morton Tea Co., 200 W. Main St.,	.40
9133	"	*Middletown.* A. B. Atkins, South Farms,	.52
9179	"	*Naugatuck.* F. K. Grant, 2 Church St.,	.32
7834	"	*New Haven.* Atlantic & Pac. Tea Co., 386 State St.,	.26
7807	"	Geo. M. Clark, 987 State St.,	.40
7826	"	C. F. Curtiss, 958 State St.,	.36
7918	"	Gilbert & Thompson, 918 Chapel St.,	.80
7912	" Young Hyson,	" " " "	1.10
7840	"	N. England Tea Co., 35 Congress Av.,	.30
7845	"	R. M. Stevens, 255 " "	.20
7828	" Gunpowder,	Union Pacific Tea Co., 779 Chapel St.,	.26
7973	"	*New London.* Keefe & Davis, 125 Bank St.,	.26
9120	"	*Putnam.* Chas. W. Bradway, 80 School St.,	.26
9117	"	J. E. Sullivan, 100 Elm St.,	.26
7764	"	*Waterbury.* J. A. Edmundson, 415 S. Main St.,	.40
7748	"	E. J. Upson, 841 N. Main St.,	.40
7968	"	*Willimantic.* H. C. Hall, 17 Union St.,	.32
7765	*Black Tea*,	*Ansonia.* G. E. May & Son, High and Maple Sts.,	.28
7768	"	D. M. Welch & Son, 186 Main St.,	.36
7786	"	*Bridgeport.* Centennial Tea Co., 856 Main St.,	.26
7793	"	J. J. Linehan, 139 Myrtle Ave.,	.26
7780	"	N. England Tea Co., 124 Fairf'd Ave.,	.32
9170	"	*Danbury.* W. Chambers, 6 West St.,	.40
9162	"	Union Pacific Tea Co., 253 Main St ,	.28
7771	"	*Derby.* E. J. Malumphy, 40 Elizabeth St.,	.40
7952	"	*Hartford.* Atlantic & Pacific Tea Co., 427 Main St.,	.40
7937	"	Buckley & Reardon, 169 Main St.,	.52
7944	"	Union Pacific Tea Co., 174 Asylum St.,	.40
7928	"	*Meriden.* J. Keating & Co., 285 W. Main St.,	.36
9135	"	*Middletown.* O. H. Cone, 262 Main St.,	.36
9131	"	New England Tea Co., 442 Main St.,	.36
9126	"	W. K. Spencer, 98 Main St.,	.20
9171	"	*Naugatuck.* The Peoples Grocery, Maple and Main Sts.,	.28
7813	" Lipton's,	*New Haven.* Geo. J. Burt, 894 State St.,	.50
7856	"	I. B. Chandler, 101 Dixwell Ave.,	.40
7808	"	A. Duhan, 1134 State St.,	.40
7838	"	U. L. Frank Tea Co., 26 Cong. Ave.,	.30
7919	" Best Eng. Breakfast,	Gilbert & Thompson, 918 Chapel St ,	1.10
7917	" Formosa Oolong,	" " "	.80
7916	" Oolong,	" " "	.50
7915	" Formosa Oolong,	" " "	1.00

TABLE VII.—CONTINUED. TEA NOT FOUND ADULTERATED.

Station No.	Brand.	Dealer.	Price per pound.
	Black Tea—Continued.		
7914	" Formosa Oolong, .	*New Haven.* Gilbert & Thompson, 918 Chapel St.,	$0.70
7913	" English Breakfast, .	" " "	.80
7833	"	Gilson Tea Co., 422 State St.,	.26
7811	"	Geo. Hugo, 1316 State St.,	.36
7848	"	J. C. Kelly, 360 Dixwell Ave.,	.26
7819	"	Kohn Bros., 55 George St.,	.26
7847	" Cooper, Cooper & Co.. India and Ceylon,	Malley, Neely & Co., 922 Chapel St.	.50
7816	"	New Haven Grocery Co., 382 State St.,	.40
7817	"	Russell Bros., 418 State St.,	.20
7842	"	Russian Tea House, 167 Cong. Ave.,	.26
7850	" Wood's Formosa, .	H. A. Smith, 7 Shelton Ave.,	.60
7802	"	Jeremiah Sullivan, 114 Nash St.,	.36
7837	"	Edgar Thomas, 859 Chapel St.,	.30
7979	"	*New London.* J. G. Arnold, 137 Shaw St.,	.40
7983	"	Grand Union Tea Co., 88 State St.,	.40
7981	"	A. M. Stacy, 123 State St.,	.26
7997	"	*Norwich.* J. D. D. Cranston, 176 W. Main St.,	.38
9102	"	Hong Kong Tea Co., 210 Main St.,	.24
7991	" English Breakfast, .	J. B. Murphy, 4 W. Main St.,	.40
7993	"	Stanton & Tyler, 58 Main St.,	.20
9121	" Formosa Oolong, .	*Putnam.* W. H. Mansfield, 47 Elm St.,	.60
9114	"	Union Pacific Tea Co., 79 Water St.,	.32
9139	"	*Stamford.* New York Grocery Co., 208 Main St.,	.26
9149	"	B. Polkin, 60 Pacific St.,	.40
7752	"	*Waterbury.* Dillon's Cash Grocery, 45 E. Main St.,	.26
7760	" Columbia, Russian, .	Waterbury Cheap Grocery, 171 S. Main St.,	.56
7741	"	Waterbury Grocery Co., 165 Bank St.,	.26
7956	"	*Willimantic.* Grand Union Tea Co., 725 Main St.,	.40
7965	"	Perkins & Blish, 66 Church St.,	.36
7769	*Mixed Tea*, ...	*Ansonia.* Union Pacific Tea Co., 204 Main St.,	.40
9158	"	*Danbury.* W. W. Edwards, 147 Main St.,	.26
7920	"	*Meriden.* Fred H. Lewis, 98 W. Main St.,	.36
7854	"	*New Haven.* Paul L. Baer, 181 Dixwell Ave.,	.30
7814	"	S. S. Adams, Court and State Sts.,	.26
9154	"	*S. Norwalk.* F. D. Lawton & Co., 22 S. Main St.,	.40
9144	"	*Stamford.* New Cash Store, 47 Canal St.,	.28
7759	"	*Waterbury.* W. Dixon & Sanson, 328 Washington Ave.,	.36
7756	"	Jas. F. Phelan, 41 E. Main St.,	.24
7761	"	*Willimantic.* W. A. Royle, 919 Main St.,	.26

A little less than three per cent. of soluble ash was found in two samples, and a little less than thirty per cent. of extract in four samples, but no one sample was deficient in both soluble ash and extract, and there is, therefore, no clear evidence of the presence of exhausted leaves.

Probably thirty per cent. of extract is too high a standard for all teas, especially as Battershall * states that low grade, but pure, Congou tea may contain as little as twenty-five per cent. Furthermore, some allowance should be made for the method of determination employed — whether the ground or unground leaf is extracted, or whether the extract is weighed or obtained by difference, etc.

In only one sample, No. 9139, were foreign leaves detected, and in that sample the quantity was small and probably due to accident.

The chemical analyses of all the samples gave no evidence of the presence of either mineral make-weights or exhausted leaves.

Nearly all, if not all, the green teas were "faced," but this is not prohibited by the United States law to which reference has been made.

It appears that none of the samples examined has been found adulterated otherwise than by facing. This is especially gratifying when it is considered that the teas examined were, for the most, part, of the cheapest grades.

In 1887, Spencer,† after examining sixty-three samples purchased in Washington, D. C., arrived at the conclusion "that there are few, if any, spurious teas on the market." He further states: "With the strict enforcement of the United States adulteration act the consumer is reasonably well protected so far as securing the genuine leaf is concerned, but, of course, has no protection from the sale of inferior teas."

Now that the law of 1897 is in force, the public has a right to expect that not only the adulterated but also the very inferior teas will be kept out of the country.

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* Food Adulteration and Its Detection, p. 25.

† U. S. Dept. Agr. Div. Chem., Bull. 13, p. 898.

TABLE VIII. — ANALYSES OF TEA.

Station No.	Brand.	Water.	Ash.			Hot water extract.
			Total.	Soluble in water.	Insoluble in water.	
7784	*Green Tea*,	4.81	8.11	3.67	4.47	36.71
7790	"	4.13	7.20	3.62	3.58	39.47
7795	"	6.25	7.66	3.62	4.04	35.32
7778	"	4.94	8.18	3.03	5.15	31.72
9159	"	5.46	6.56	3.56	3.00	38.81
7773	"	5.89	6.72	3.53	3.19	36.55
7934	"	5.46	7.23	3.45	3.78	38.81
7951	"	5.37	6.98	3.75	3.23	39.06
7932	"	4.06	7.62	3.56	4.06	40.00
7930	"	4.21	7.38	3.62	3.76	38.48
9133	"	3.92	6.78	3.63	3.15	39.54
9179	"	5.62	7.09	3.42	2.67	36.34
7834	"	4.99	6.76	3.83	2.93	39.45
7807	"	4.40	6.96	3.76	3.20	37.89
7826	"	4.90	6.77	3.69	3.08	40.08
7918	"	5.80	6.13	3.53	2.60	39.67
7912	"	5.77	6.24	3.99	2.25	39.30
7840	"	3.89	6.96	3.77	3.19	39.34
7845	"	6.24	7.08	3.74	3.34	36.76
7828	"	5.87	8.39	2.80	5.59	30.82
7973	"	6.18	6.19	3.48	2.71	32.83
9120	"	6.82	7.72	3.36	4.36	35.60
9117	"	4.97	7.31	3.48	3.83	35.31
7764	"	4.23	6.97	3.61	3.36	39.65
7748	"	6.00	8.06	4.01	4.05	35.96
7968	"	4.42	7.20	3.79	3.41	39.23
7765	*Black Tea*,	5.86	6.30	3.59	2.71	34.96
7768	"	4.89	6.32	3.71	2.61	36.05
7786	"	5.64	6.27	3.47	2.80	38.54
7793	"	6.59	5.95	3.50	2.45	41.43
7780	"	6.55	6.77	3.17	3.60	34.47
7771	"	5.57	6.23	3.33	2.90	28.48
9170	"	5.85	6.62	3.53	3.09	36.54
9162	"	6.52	7.42	3.60	3.82	29.90
7952	"	5.32	6.17	3.52	2.65	36.69
7937	"	5.31	6.18	3.66	2.52	37.79
7944	"	6.23	6.35	3.87	2.48	39.11
7928	"	5.48	6.71	3.70	3.01	37.42
9135	"	6.01	6.42	3.51	2.91	36.04
9131	"	6.02	6.12	3.46	2.66	35.96
9126	"	5.89	5.99	3.04	2.95	35.49
9171	"	5.64	6.06	3.49	2.57	40.76
7813	"	6.93	5.68	3.58	2.10	36.62
7856	"	5.74	5.88	3.56	2.32	41.23
7808	"	6.07	6.27	3.53	2.74	38.34
7838	"	5.85	6.86	3.76	3.10	33.21
7919	"	6.85	5.79	3.85	1.94	33.75
7917	"	5.95	6.42	3.64	2.78	37.05

TABLE VIII. — ANALYSES OF TEA. —*Continued.*

Station No.	Brand.	Water.	Ash.			Hot water extract.
			Total.	Soluble in water.	Insoluble in water.	
7916	*Black Tea — Continued*,	5.41	6.39	3.62	2.77	40.34
7915	"	5.80	5.83	3.48	2.35	42.68
7914	"	5.81	6.14	3.62	2.52	41.17
7913	"	6.92	6.05	3.90	2.15	32.54
7833	"	6.01	5.99	3.36	2.63	33.49
7811	"	6.12	5.75	3.23	2.52	38.94
7848	"	6.32	6.15	3.41	2.74	34.99
7819	"	6.60	6.39	3.75	2.64	31.24
7847	"	6.13	5.63	3.55	2.08	38.10
7816	"	5.18	6.89	3.94	2.95	44.92
7817	"	5.33	6.23	3.10	3.13	35.19
7842	"	6.57	6.63	3.83	2.80	29.43
7850	"	5.52	6.14	3.69	2.45	38.18
7802	"	5.66	6.16	3.55	2.61	39.50
7837	"	6.09	6.14	3.35	2.79	33.39
7979	"	6.40	5.92	3.93	1.99	32.13
7983	"	5.12	7.33	4.75	2.58	34.89
7981	"	6.27	6.61	3.51	3.10	37.32
7997	"	5.51	5.98	3.69	2.29	38.82
9102	"	6.10	6.22	3.03	3.19	34.00
7991	"	6.29	5.67	3.68	1.99	38.82
7993	"	6.01	6.25	3.70	2.55	39.09
9121	"	5.33	5.87	3.62	2.25	39.96
9114	"	6.00	5.99	2.87	3.12	32.92
9139	"	6.06	6.39	3.14	3.25	34.61
9149	"	7.14	6.56	3.73	2.83	31.10
7752	"	5.62	6.83	3.91	2.92	33.40
7760	"	6.51	5.57	3.26	2.31	29.66
7741	"	4.73	6.77	3.43	3.34	36.62
7956	"	5.18	6.32	3.89	2.43	36.66
7965	"	6.54	7.09	4.53	2.56	36.48
7769	*Mixed Tea (Green and Black)*,	5.75	6.66	3.66	3.00	33.98
9158	"	6.14	6.45	3.29	3.16	33.31
7920	"	6.40	6.00	3.62	2.38	35.86
7854	"	5.96	6.65	3.43	3.22	37.18
7814	"	6.45	5.90	3.49	2.41	36.02
9154	"	6.13	6.56	3.48	3.08	36.07
9144	"	6.38	7.15	4.37	2.78	31.23
7759	"	5.81	7.55	4.42	3.13	36.27
7756	"	5.77	6.96	3.63	3.33	31.94
7961	"	6.78	7.31	3.78	3.53	31.67

COFFEE, COFFEE COMPOUNDS, AND COFFEE SUBSTITUTES.

By A. L. Winton.

Seventy-three samples were examined, as follows:

		Unground.	Ground.	Total.
Coffee,	Not found adulterated,	21	13	34
	Adulterated,	2	9	11
Coffee compounds,		2	20	22
Coffee substitutes,		0	6	6
				73

Coffee.

Descriptions of the samples not found adulterated are given in Table IX and of the adulterated samples in Table X. The proportion of samples found adulterated to the whole number examined during the present year has been much less than during the two preceding years, as shown by the following figures:

Percentage of Samples Found Adulterated.

	Unground.	Ground.	Total.
1896,	25.0	89.2	63.3
1897,	7.7	86.6	57.7
1898,	8.7	40.9	24.4

This improvement is believed to be due to the operation of the pure food law. Mixtures of coffee with peas, chicory, and other materials are still on the market, but they are now sold more generally under distinctive names in labeled packages.

In quoting the statements found on the packages we must not be understood as thereby, in any instance, vouching for their truth.

TABLE IX.—COFFEE NOT FOUND ADULTERATED.

Station No.	BRAND.	DEALER.	Price per ½ pound, cts.
	Unground Coffee.		
9160	Sold in bulk,	*Danbury.* Atlantic & Pac. Tea Co., 163 Main St.,	10
9169	" "	W. Chambers, 6 White St.,	13
9161	" "	Union Pacific Tea Co., 253 Main St.,	9
7946	Mocha & Java Coffee, American Mills, New York,	*Hartford.* J. C. & Co., 558 Asylum St.,	25*
7935	Sold in bulk,	Grand Union Tea Co , 249 Main St.,	12
7799	" "	*Meriden.* Centennial Tea Co., 41 E. Main St.,	13
7925	" "	Russell Bros., 2 Colony St..	13
7927	" "	Pierce & Hupfer, 111 Britannia St.,	13
9136	" "	*Middletown.* O. H. Cone, 262 Main St.,	13
9130	" "	New Eng. Tea Co.. 442 Main St.,	13
9127	" "	W. K. Spencer, 98 Main St.,	10
9174	" "	*Naugatuck.* Charlie Ark & Co., Maple St.,	14
7832	Old Government Java & Mocha 400 Coffee, Isaac Newton, New York,	*New Haven.* Gilson Tea Co , 405 State St.,	35*
7985	Sold in bulk,	*New London.* H. Levin, 38 Bradley St.,	10
7982	" "	A. M. Stacy, 123 State St.,	10
7996	" "	*Norwich.* W. A. Church, 18 Market St.,	13
9116	" "	*Putnam.* George Farley, 20 Providence St.,	18
9112	" "	Union Pacific Tea Co., 79 Water St.,	11
9138	Fifth Ave. Mocha & Java, O'Donohue Coffee Co., New York,	*Stamford.* H. S. Daskam, 59 Atlantic St.,	35*
9140	Sold in bulk,	New York Grocery Co., 208 Main St.,	13
9150	" "	B. Polkin, 60 Pacific St.,	13
	Ground Coffee.		
7785	Sold in bulk,	*Bridgeport.* Centennial Tea Co., 856 Main St.,	10
7777	" "	Union Pacific Tea Co., 416 Main St.,	8
7947	Flag Brand Mocha & Java, W. H. Raymond Grocery Co., Boston,	*Hartford.* George F. Kellogg, 123 Ann St.,	35*
7986	Crown Royal Mocha & Java, G. W. Whitford, Providence,	*New London.* T. W. Potter, 72 State St.,	35*
9107	Red Label Java & Mocha, Winslow, Rand & Watson, Boston,	*Norwich.* A. T. Otis, 261 Main St.,	35*
7815	Sold in bulk,	*New Haven.* S. S. Adams, 412 State St.,	8
7827	" "	C. F. Curtis, 958 State St.,	13
7839	" "	Unite L. Frank Tea Co., 26 Congress Ave.,	9
7852	" "	C. Kipp, 290 Dixwell Ave.,	13
7843	" "	Russian Tea House, 167 Congress Ave.,	8
7801	Rex Mocha & Java, Lincoln, Seyms & Co., Hartford,	J. Sullivan, 114 Nash St.,	30*
7836	Sold in bulk,	Thomas, 859 Chapel St.,	14
7824	" "	R. Zeidler, 768 Grand Ave.,	13

* Per pound package.

TABLE X.—ADULTERATED COFFEE.

Station No.	DEALER.	Price per ½ pound, cts.	ADULTERANTS.
	Unground Coffee.		
9145	*Stamford.* New Cash Store, 47 Canal St.,	11	29% imitation coffee,[1] 26% peas, 9% chicory.
9142	W. W. Waterbury, 207 Main St.,	11	24% imitation coffee,[1] 26% peas, 6% chicory.
	Ground Coffee.		
7779	*Bridgeport.* New England Tea Co., 124 Fairfield Ave.,	13	Peas, chicory, and wheat or rye.
7821	*New Haven.* Kohn Bros., 55 George St.,	13	Chicory, and wheat or rye.
7841	New England Tea Co., 35 Congress Ave.,	13	Peas, chicory.
7829	Union Pacific Tea Co., 779 Chapel St.,	13	Chicory, and wheat or rye.
7974	*New London.* J. E. St. John, 265 Bank St.,	13	Hulled peas, chicory.
7751	*Waterbury.* C. A. Bailey, 834 N. Main St.,	13	Peas, chicory.
7746	H. W. Foote, 447 W. Main St.,	10	Peas, chicory.
7744	New York & China Tea Co., 181 So. Main St.,	13	Chicory, pea-hull pellets.[2]
7755	J. F. Phelan, 41 E. Main St.,	13	Chicory, pea-hull pellets [2]

[1] Brown lumps made from wheat middlings to resemble coarsely crushed roasted coffee.

[2] Made of pea hulls and middlings, resembling roasted coffee.

COFFEE COMPOUNDS.

The pure food law provides that a food product shall not be deemed adulterated "in the case of articles labeled, branded, or tagged so as plainly or correctly to show that they are mixtures, compounds, combinations, or blends." It thus appears that a mixture of coffee with other materials, which if sold under the name of coffee would be regarded as adulterated, is a legitimate article of trade when sold in a package bearing a *correct* statement of its character. In labeling such packages, however, various subterfuges are resorted to for the purpose of deceiving the purchaser.

The word "compound" or a statement of composition may appear on the label, but in such small letters or in such an obscure position as to easily escape the notice of the purchaser, or the wording may be such as to convey the impression that the preparation is a compound of coffees rather than of coffee with other materials.

Plates I and II show photographic reproductions of three labels which illustrate these statements.

Some of the preparations described in the following paragraphs were properly labeled, but several instances of deception, if not of violation of the law, may be noted.*

The seven samples named below, representing four brands, contained

Coffee, Peas, and Chicory:

7772, 9123, and 7957. These three samples were purchased at stores of the Grand Union Tea Co., in Derby, Middletown, and Willimantic. In each case the bag was marked at the time of purchase with the words "Royal Compound." The price paid was 13 cents per half pound.

9173. "Boardman & Son's Compound Prime Old Java Coffee, 304 Asylum St., Hartford." "Compound" was in much smaller letters than the rest of the label. Bought of The People's Grocery, Naugatuck. Price, 25 cents per pound package. (See plate I.)

7809. "Imperial Compound Java and Mocha Coffee. Is made from coffees selected especially for their strength, flavor, and superior drinking qualities. Capitol Mills, Hartford, Conn." Bought of Aug. Reisinger, 1267 State St., New Haven. Price, 25 cents per pound can.

7823. "Welcome Coffee Compound. Bryan, Miner & Read, New Haven." Bought of D. M. Welch & Son, 28 Congress Ave., New Haven. Price, 25 cents per pound package; bar of soap given away with the package.

7750. "Good Luck Coffee. O. H. Blanchard, Hartford, Conn. This coffee is compounded from the very best stock, and is as wholesome as the bread we eat. It is double the strength of pure, imported goods, and will make more cups of rich, delicious drink than any other coffees." Bought of E. J. Upson, 841 Main St., Waterbury. Price, 25 cents per pound package; with glass tumbler.

The following sample contained

Coffee, Peas, Chicory, and Wheat or Rye:

7954. "Compound" [stamped on bag]. Bought of J. H. McGuire, 16 Church St., Hartford. Price, 13 cents per half pound.

* For description of other brands, see Rep. 1896, p. 57.

The two following samples were mixtures of

*Coffee, Peas, Chicory, and Imitation Coffee :**

9181. "Red D Prepared Coffee, John C. Turnbull, New York. Red D Prepared Coffee is crushed and packed immediately after roasting, thus preserving the full aroma and flavor, making a rich cup of coffee." Bought of W. F. Brennan, Naugatuck. Price, 25 cents per pound package. Cup and saucer given away with each pound.

7818. "Combination" [stamped on bag]. Bought of Russell Bros., 418 State St., New Haven. Price, 10 cents per half pound.

The following were mixtures of

*Coffee, Peas, Chicory, and Imitation Coffee :**

9180. "Old Reliable Coffee. The Nutmeg Coffee and Spice Mills, Hartford. A compound of delicious drinking coffees and guaranteed to please those who like a full, heavy-bodied cup of Coffee." Bought of W. J. Kelly, Naugatuck. Price, 25 cents perpound can. (See plate I.)

7994. "Stanton's Vegetable Compound Coffee. Stanton & Tyler, Norwich. We do not claim for this wholly the title of coffee, but a compound prepared from fresh, sweet, and nutritious cereals and pure Santos coffee, which is very rich and aromatic." Bought of Stanton & Tyler, Norwich. Price, 20 cents per pound package.

The following brand was composed of

Coffee, Chicory, and Pellets:†

7835. "The Great Atlantic & Pacific Tea Co.'s Granulated 8 o'Clock Breakfast Coffee Mixture. 45% choicest coffee, 30% choicest English chicory, 25% cereals." Bought at their store, 386 State St., New Haven. Price, 13 cents per half pound.

The following brand contained

Coffee, Peas, Chicory, and Pellets :†

7962. "Crown Jewel Java Coffee. Packed by Grand Central Tea Importing Co., New York. Made of pure coffee and cereals." Bought of W. A. Royle, 919 Main St., Willimantic. Price, 22 cents per pound package. (See plate II.)

* Brown lumps, made from wheat middlings to resemble coarsely crushed roasted coffee.

† Made from pea-hulls and middlings.

DIRECTIONS.
USE ONE TEASPOONFUL TO EACH CUP OF WATER. DO NOT BOIL THE COFFEE, BUT USE BOILING WATER. AND LET IT STAND A FEW MINUTES BEFORE STRAINING. WITH CONDENSED MILK, OR CREAM, IT WILL PROVE A DELICIOUS BEVERAGE.
MADE OF PURE COFFEE AND CEREALS
ONE POUND
Crown Jewel Coffee.
CROWN JEWEL
JAVA
COFFEE
PACKED BY
GRAND CENTRAL TEA IMPORTING CO.
77-79 HUDSON ST.
NEW YORK.
PACKED BY
GRAND CENTRAL TEA CO.,
77-79 Hudson Street, New York.
OPEN THIS END.
THIS is the best that has ever been put up for the money, and is strongly recommended by some of the best families in America for strength, flavor and economy.

PLATE II. LABEL ON PACKAGE OF A COFFEE COMPOUND.

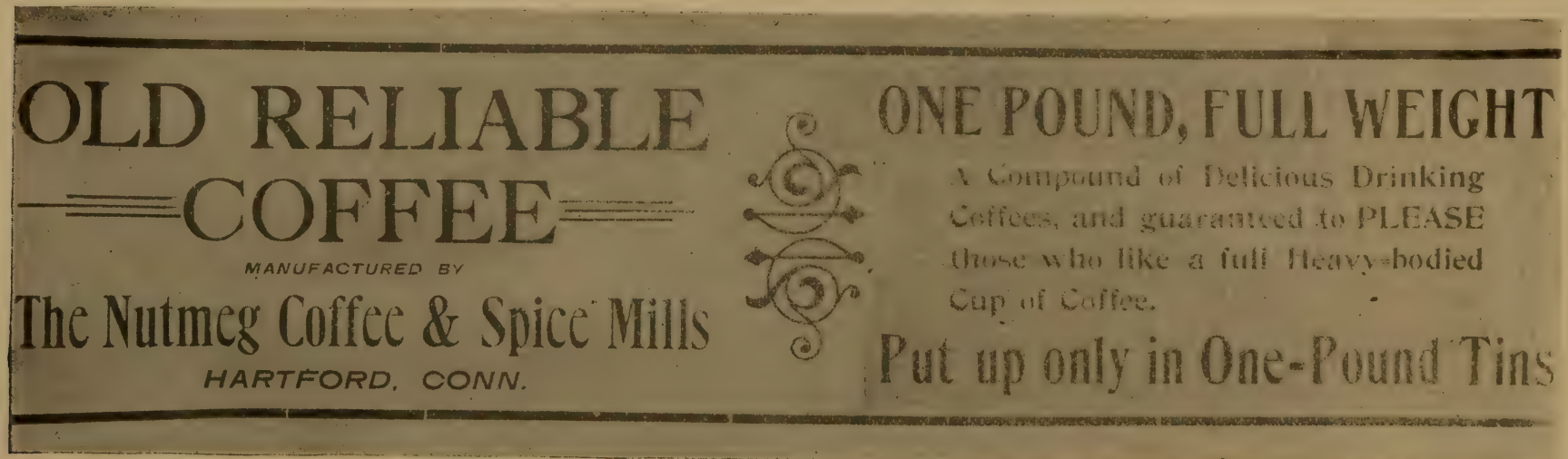
OLD RELIABLE
COFFEE
MANUFACTURED BY
The Nutmeg Coffee & Spice Mills
HARTFORD, CONN.
ONE POUND, FULL WEIGHT
A Compound of Delicious Drinking Coffees, and guaranteed to PLEASE those who like a full Heavy-bodied Cup of Coffee.
Put up only in One-Pound Tins

PLATE I. LABELS ON PACKAGES OF COFFEE COMPOUNDS.

The two brands named below are coffees of low grade, roasted and unground, containing a very little sugar:

7831. "Arbuckle's Ariosa Coffee. New York and Pittsburg. Ariosa is a compound made from coffee, sugar, and eggs. The coffees are selected especially for their strength, flavor, and superior drinking qualities, are pure, sound coffees, and absolutely free from all the poisonous coloring substances which are now so largely used to improve the appearance of coffee. Coffee when roasted is porous, and, unless prevented, loses its best qualities and absorbs others that are injurious to it. By our process of *hermetically sealing* the pores of roasted coffee, we secure a three-fold object: 1st, the retention of the full strength and aroma for any length of time; 2d, the prevention through absorption of any injurious flavors; 3d, the saving to the consumer of the additional expense of eggs incurred when any other coffee is used. ARIOSA is self-settling. Choicest eggs and pure granulated sugar are the only articles used in HERMETICALLY SEALING ARBUCKLE'S ARIOSA COFFEE. Formula: Coffee, .99278; eggs, .00361; sugar, .00361." Bought of Coe & Jenks, 422 State St., New Haven. Price, 15 cents per pound package.

7804. "Lion Fancy Roasted Coffee, Woolson Spice Co., Toledo, Ohio. This package contains only the genuine coffee berry. It is sealed with pure reclarified sugar for the purpose of preserving its strength and purity." Bought of Philip Hugo, 28 Edwards St., New Haven. Price, 15 cents per pound package.

COFFEE SUBSTITUTES.

Various preparations of wheat, rye, barley, peas, etc., containing no real coffee, are sold under special names for those who for any reason prefer them to genuine coffee.

Four such coffee substitutes were examined in 1896, and are described in the report for that year, page 61. The following additional brands were purchased during the month of Oct., 1897:

Two of these consisted of

Whole Barley Kernels, roasted.

7782. "Fischer Mills Fresh Roasted Malt Coffee. B. Fischer & Co., N. Y." Bought of I. P. Prescott, Water and State Sts., Bridgeport. Price, 15 cents per package.

7887. "Kneipp Malt Coffee. Kneipp Malt Food Co., New York and Chicago." Bought at Food Exposition, New Haven, Oct., 1897. Price, 15 cents per package.

The following two samples were prepared from

Roasted Cereals.

7844. "Grain-O. A table beverage which the children may drink without injury as well as the adult. Prepared by the Genesee Pure Food Co., LeRoy, N. Y." Bought of R. M. Stevens, 255 Congress Ave., New Haven. Price, 15 cents per package.

7846. "Postum Cereal, A Toothsome, Healthful Beverage. Postum Cereal Co., Lim. Battle Creek, Mich." Bought of H. M. Tower, 379 Congress Ave., New Haven. Price, 25 cents per package.

The following sample consisted of small brown lumps made from

Pea Hulls with a Paste of Wheat Flour or Middlings.

7933. "Wheat Coffee." Bought of Grant's Tea Store, State and Main Sts., Meriden. Price, 10 cents per pound.

One sample consisted of

Roasted and partially Ground Wheat.

7886. "Old Grist Mill Entire Wheat Coffee. Potter & Wrightington, Agents, Boston." Bought at Food Exposition New Haven, Oct., 1897. Price, 20 cents per package.

(The Old Grist Mill Entire Wheat Coffee examined in 1896 contained not only wheat but also peas and real coffee. See Report, 1896, p. 60.)

GINGER.

By A. L. Winton and W. L. Mitchell.

Ginger is the root or more correctly speaking, the underground stem of a perennial herbaceous plant, *Zingiber officinale*, Rosc., which is cultivated in India, its native country, and also in Jamaica, Cochin China, Africa, and Australia.

Ginger root is used in a "recent" or undried state for the preparation of preserves and confectionery, but most of it is dried in the countries where it is produced and shipped in this form.

Jamaica ginger, which is considered the finest on the market, is scraped before drying to remove the outer coatings, and frequently it is "bleached" or coated with chalk as a protection against the drug-store beetle and other destructive insects. In other countries the root is usually dried without removing the epidermis, although occasionally it is scraped, bleached, or otherwise prepared in imitation of the higher priced Jamaica variety.

At the time when the samples described in this chapter were purchased (Oct., 1897), the following wholesale prices were quoted:

Jamaica, bleached, 19 cents per pound.
Jamaica, scraped, 18 cents per pound.
Cochin, 5¼ to 7¼ cents per pound.
African, 4½ cents per pound.
Calcutta, 4 cents per pound.

The unground ginger imported into the United States for the year ending July 30, 1896, amounted to 4,827,703 pounds, and was valued by the custom house officials at 5 cents per pound, making a total wholesale value of $226,251.56.

Adulteration of Ginger. — Rice middlings, wheat flour, corn meal, mustard husks, turmeric, sawdust, gypsum, and chalk are frequently mixed with ground ginger. Exhausted ginger, the dried residues from the ginger ale and extract factories, is extensively used as an adulterant in England and to some extent in this country.

Examination of Samples.

Ninety-one samples purchased by agents of the station have been examined by the methods described on page 186, and may be grouped as follows:

	In labeled packages.	In bulk.	Total.
Not found adulterated,	19	48	67
Adulterated,	4	20	24
Total,	23	68	91
Per cent. of samples adulterated,	17.4	29.4	26.4

In Table XI are given the names and addresses of the dealers from whom the samples not found adulterated were purchased, the prices paid, and also, in the case of samples

bought in labeled packages, the names of the brands and of the manufacturers. The adulterated samples are described in like manner in Table XII, and in addition the foreign materials detected in each case are given.

The chemical analyses of the samples will be found in Table XIV.

The adulterant most commonly found in the ground ginger bought in Connecticut was rice middlings, a by-product consisting of the inner seed-coats of the grain with more or less starchy matter. It was present in 20 out of 24 adulterated samples, and in 16 of these it was the only adulterant detected.

Three samples contained gypsum: No. 9235, 19.47 per cent.; No. 7980, 8.35 per cent.; and No. 7747, 8.35 per cent. The other foreign materials detected were wheat middlings, sawdust, corn meal, mustard husks, and turmeric. Samples Nos. 7740 and 7960 contained turmeric, but were believed to be otherwise pure.

Although all the samples were examined by the best approved methods for the detection of exhausted ginger, there was no evidence in any case that this adulterant was present.

Table XI. Ginger not found Adulterated.

Station No.	Brand.	Dealer.		Price per ¼ pound, cents.
7766	Sold in bulk, ...	*Ansonia.*	G. E. May & Son, High and Maple Sts.,	8
9414	Pure ginger. Stickney & Poor,		D. M. Welch & Son, Main St.,	10
7788	Sold in bulk, ...	*Bridgeport.*	China & Japan Tea Co., 820 Main St.,	10
7789	Slade's Absolutely Pure Ginger. D. & L. Slade Co., Boston, .		E. H. Davis, 60 Courtland St.,	10
7775	Genuine Borneo Ginger. Bennett, Simpson & Co., London,		Lee & Ketcham, 20 Fairfield Ave.,	10
7776	Sold in bulk, ...		Union Pacific Tea Co., 416 Main St.,	7
7796	" "		C. H. Stevens, 398 E. Main St.,	8
9168	" "	*Danbury.*	W. C. Chambers, 6 West St.,	10
9165	" "		McGraw & Baldwin, 93 White St.,	8
7774	" "	*Derby.*	J. McEnerney, 75 Elizabeth St.,	8
7486	" "	*Hartford.*	Allen Bros., 132 Main St.,	10
7936	" "		Buckley & Reardon, 169 Main St.,	7
7494	" "		Cady & Lombard, 69 Albany Ave.,	10
7492	" "		Empire Cash Grocery, 94 Albany Ave.,	8
7941	Red Shield Ginger. Jas. G. Powers & Co., N. Y., . .		Joseph Hagerty, 75 Front St.,	10
9410	Pure Jamaica Ginger. Hills & Co., ...		Hills & Co., 368 Asylum St.,	10
7499	Sold in bulk, ...		E. M. Palmer, 124 Albany Ave.,	10
7489	" "		Chas. A. Post, 709 Main St.,	10
7472	" "		C. H. Russell, 383 Main St.,	5
7479	" "		A. H. Tillinghast, 91 Main St.,	10
7943	Pure Ginger. Union Spice Co.,		Union Pacific Tea Co., 174 Asylum St.,	10
7800	Blue Ribbon Pure African Ginger. Austin Nichols & Co., N. Y.,	*Meriden.*	H. E. Bushnell, 79 W. Main St.,	10
7931	Sold in bulk, ...		Grant's Tea Store, State and Main Sts.,	5
7929	" "		Morton Tea Co., 200 W. Main St.,	10
7926	" "		Pierce & Hupfer, 111 Britannia St.,	10
9134	Pure Ginger. E. J. Gillies & Co, N. Y., ...	*Middletown.*	O. H. Cone, 262 Main St.,	10
9122	Sold in bulk, ...		Grand Union Tea Co., 272 Main St.,	10
9129	" "		N. England Tea Co., 442 Main St.,	10
9124	" "		J. B. Patterson, 110 Main St.,	7
9178	" "	*Naugatuck.*	F. K. Grant, 2 Church St.,	8
9177	Pure Ginger, Capital Mills. Lincoln, Seyms & Co., Hartford,		The Grant Grocery Co., Maple St.,	10
9172	Sold in bulk, ...		The People's Grocery, Main and Maple Sts.,	10
7972	" "	*New London.*	Keefe & Davis, 125 Bank St.,	8
7988	" "		Kellogg & Avery, 27 Truman St.,	7
7978	Ginger. Wm. Boardman & Son, Hartford, ...		Albert Peck, Howard St.,	10
7976	Sold in bulk, ...		Thomas & Gumble, 437 Bank St.,	10
9230	Pure Ginger. Equitable Mills. F. R. Farrington & Co., N. Y. and Boston, . . .	*New Haven.*	S. S. Adams, 412 State St.,	5
7737	Sold in bulk, ...		Daniel Dore, 579 Grand Ave.,	5
7738	" "		Mrs. Foley & Co., 763 Grand Ave.,	9
7739	" "		N. A. Fullerton, 926 Chapel St.,	10

TABLE XI. GINGER NOT FOUND ADULTERATED. — CONTINUED.

Station No.	Brand.	Dealer.		Price per ¼ pound, cents.
7730	Pure African Ginger. Howard & Co., N. Y.,	*New Haven.*	Mrs. M. L. Gerner, 860 State St.,	10
7729	Sold in bulk,		" " "	10
7728	Absolutely Pure Ginger. The F. C. Bushnell Co , N. Haven,		Gibbons Bros., 824 State St.,	10
7632	Sold in bulk,		L. Goldbaum, 177 Congress Ave.,	8
7736	" "		N. Haven Prov. Co., 398 Grand Ave.,	8
7461	" "		A. B. Stevens, 61 Broadway,	10
7733	" "		L. C. Strickland, 99 Grand Ave.,	10
7725	Pure Ginger. Crescent Mills, J. P. Auger, New Haven,		Wm. Tansey, 29 Williams St.,	10
7447	Sold in bulk,		H. M. Tower, 379 Congress Ave.,	7
7726	" "		W. E. Waterbury, 774 State St.,	5
7734	Absolutely Pure Ginger. D. M. Welch & Son,		D. M. Welch & Son, 8 Grand Ave.,	8
7454	Sold in bulk,		" " 28 Congress Ave.,	5
7995	" "	*Norwich.*	W. A. Church, 18 Market St.,	10
7990	" "		J. P. Murphy, 4 W. Main St.,	10
9119	" "	*Putnam.*	C. W. Bradway, 80 School St.,	8
9111	Pure Ginger. A. C. Stetson,		A. C. Stetson, Water St.,	10
9113	Sold in bulk,		Union Pacific Tea Co., 79 Water St ,	8
9137	" "	*Stamford.*	H. S. Daskam, 59 Atlantic St.,	8
9156	" "	*S. Norwalk.*	G. E. Friedrick, 20 Railroad Sq.,	8
9153	" "		F. D. Lawton & Co., 22 S. Main St.,	8
9152	" "		C. E. Seymour, 33 Washington St.,	10
7754	" "	*Waterbury.*	Dillon's Cash Store, 45 E. Main St.,	10
7763	Ginger. Helmet XXX Brand. E. R. Durkee & Co., N. Y.,		J. A. Edmundson, 415 S. Main St.,	10
7757	Sold in bulk,		T. P. Kelley, 38 S. Riverside St.,	10
7966	" "	*Willimantic.*	H. C. Hall, 17 Union St.,	10
7969	Pure Ginger. The E. S. Kibbe Co., Hartford,		H. Levins, 493 Main St.,	10
9409	Pure African Ginger. Bugbee & Brownell, Providence,		Burt Thompson, Main St.,	10

Table XII. Adulterated Ginger.

Station No.	Brand.	Dealer.	Price per ¼ pound, cents.	Adulterated.
		Ansonia:		[turmeric.
7767	Sold in bulk, . .	D. M. Welch & Son, 186 Main St.,	8	Rice middl'gs, corn meal,
		Bridgeport:		
7792	" " . .	Peoples Groc.& Prov. Co.,124 Rail'd Av.,	5	Rice middlings, turmeric.
7781	" " . .	I. P. Prescott, Water and State Sts.,	9	Rice middlings.
9033	Pure Ginger. Wm. A. Leggett & Co., N. Y.,	E. L. Sullivan, 436 E. Main St.,	8	Rice middlings, turmeric.
		Danbury:		
9157	Sold in bulk, . .	W. W. Edwards, 147 Main St.,	8	Rice middlings.
		Hartford:		[turmeric, 19.47% gypsum.*
9235	" " . .	Barrows & Thalheimer, 525 Main St.,	10	Sawdust, wheat midd'ngs,
7953	" " . .	J. H. McGuire, Standard House, 16 Church St.,	10	Rice middlings, turmeric.
7939	" " . .	M. J. Warren, Sheldon and Front Sts.,	10	Rice middlings, turmeric.
		Meriden:		
7798	" " . .	Centennial Tea Co., 41 E. Main St.,	8	Rice middlings.
		New Haven:		
7732	" " . .	C. F. Curtiss, 973 State St.,	10	Rice middlings.
7735	" " . .	W. S. Graves, 341 Grand Ave.,	10	Rice middlings, mustard husks, turmeric.
7633	" " . .	P. R. Lyons, 413 Congress Ave.,	8	Rice middlings, turmeric.
7465	" " . .	John T. Pohlman, 140 Dixwell Ave.,	8	Rice middlings.
		New London:		
7984	" " . .	H. Levin, 38 Bradley St.,	5	Rice middlings.
7980	Pure Ginger. E. P. Hornick, N. Y., .	A. M. Stacy, 123 State St.,	10	8.35 per cent. gypsum.*
		Norwich:		
7998	Ginger. The Challenge Mills, N. Y., . .	E. F. Burlingame, 128 W. Main St.,	10	Rice middlings, turmeric.
9104	Sold in bulk, . .	A. B. Peckham, 147 Franklin St.,	8	Rice middlings.
		Putnam:		
9115	" " . .	Geo. Farley, 20 Providence St.,	10	Rice middlings.
		Stamford:		
9143	" " . .	New Cash Store, 47 Canal St.,	5	Rice middlings, turmeric.
9148	" " . .	B. Polkin, 60 Pacific St.,	6	Wheat, rice middlings.
9147	Ginger. Square Deal Pure Spices, . .	I. N. Waterbury, 142 Pacific St.,	7	Rice middlings.
		Waterbury:		[cent. of gypsum.*
7747	Sold in bulk, . .	Kinney & Balfe, 674 N. Main St.,	10	Rice middlings, 8.35 per
7740	" " . .	Waterbury Grocery Co., 165 Bank St.,	10	Turmeric.
		Willimantic:		
7960	" " . .	W. A. Royle, 919 Main St.,	8	Turmeric.

* $CaSO_4 + 2H_2O$ calculated from CaO.

Discussion of the Analyses.

The following maxima and minima results show the range in composition of samples of pure ginger-root and also of pure and adulterated ground ginger found in the market The analyses of two samples of exhausted ginger are given with these for comparison.

Table XIII.—Analyses of Ginger, Pure and Adulterated. Range of Composition.

		Ash.			Lime.	Ether extract.		Alcohol extract.	Cold water extract.
		Total.	Soluble in water.	Insoluble in HCl.		Volatile.	Non-volatile.		
Whole Ginger, 13 samples, not coated with chalk.*	Max.	7.55	4.09	2.29	0.71	3.09	5.42	6.58	17.55
	Min.	3.61	2.17	0.05	0.20	1.61	3.37	4.36	12.04
Whole Ginger, 5 samples, coated with chalk.*	Max.	9.35	2.95	1.28	3.53	1.49	4.02	5.37	16.10
	Min.	4.34	1.73	0.02	1.07	0.96	2.82	3.63	10.92
Ground Ginger, 67 samples, not found adulterated.	Max.	9.80	4.10	4.30	0.62	2.37	5.99	7.27	15.72
	Min.	4.32	2.30	....	....	0.70	3.02	3.29	11.30
Ground Ginger, 24 samples, adulterated.	Max.	19.26	6.25	3.55	6.34	1.83	8.49	9.88	19.13
	Min.	3.77	1.56	....	....	0.26	1.27	3.50	11.06
Exhausted Ginger, No. 9727.*		2.12	0.59	0.18	....	1.61	3.86	4.88	6.15
Exhausted Ginger, No. 9368.*		5.05	3.55	1.50	....	0.13	0.54	1.52	16.42

Young† found in 7 samples of pure ginger from 3.40 to 8 00 per cent. of ash and Richardson,‡ in 6 samples, 3.39 to 7.02 per cent. In the analyses of 104 samples, as collated by Allen, the maximum percentage of ash was 10.65.

The Bavarian chemists consider as adulterated all ginger containing over 8 per cent. of ash and 3 per cent. of sand. In the *Codex alimentarius austriacus* it is stated that genuine ginger should not have more than 8 per cent. or less than 1.5 per cent. of ash.

High percentages of ash usually indicate the presence of either sand or of a lime salt. Sand (ash insoluble in HCl) is usually an accidental impurity; sulphate of lime, except when present in small amounts, must, however, be regarded as an adulterant.

"Limed" ginger has been found to contain 1.0 to 3 5 per cent. of lime as carbonate.

Eleven of the samples of ground ginger, containing from 8 to 9.80 per cent. of ash and from 2.50 to 4.30 per cent. of sand, although inexcusably dirty, are classed with those not found adulterated. Samples Nos. 9235, 7980, and 7747 contain not only high percentages of ash, but from 2.72 to 5.55 per cent. of lime as sulphate, and they are without doubt adulterated.

* See page 192.

† Analyst, *9*, 214.

‡ U. S. Dept. Agr. Div. Chem., Bull., *10*, 216.

TABLE XIV. ANALYSES OF GROUND GINGER FROM THE CONN. MARKET.

Station No.		Moisture.	Ash.			Lime (CaO.)	Ether extract.		Alcohol extract.	Cold water extract.
			Total.	Soluble in water.	Insoluble in HCl.		Volatile.	Non-volatile.		
7766	Not found Adulterated.	9.40	7.25	2.82			1.18	3.58	4.83	13.99
9414		9.86	9.17	4.00	3.25	0.32	1.57	3.81	4.87	13.64
7788		9.40	5.89	2.86			1.84	4.53	6.00	13.04
7789		9.54	7.09	3.21			2.01	3.63	5.32	12.78
7775		10.60	4.37	2.56			1.09	4.07	4.91	13.82
7776		8.90	8.00	3.48	2.55	0.60	1.83	3.97	5.49	12.10
7796		9.36	6.50	3.10			1.92	4.15	5.30	12.51
9168		9.58	7.47	3.08			1.24	3.82	5.16	12.81
9165		9.35	4.88	2.52			1.15	3.54	4.99	13.55
7774		9.59	7.17	2.96			0.93	3.60	4.80	11.70
7486		9.11	5.65	3.31			1.52	4.25	5.27	12.60
7936		8.63	7.68	3.06			1.63	4.41	5.17	13.83
7494		9.47	8.25	3.36	2.50	0.46	0.98	3.81	4.96	13.17
7492		8.83	4.89	2.83			1.87	5.62	6.72	13.75
7941		7.79	7.58	3.25			1.88	4.37	5.24	13.50
9410		8.77	4.32	2.84			1.73	5.06	5.28	15.72
7499		9.44	6.05	2.79			1.40	4.44	5.64	11.76
7489		8.45	5.11	2.85			2.06	5.99	7.17	11.30
7472		8.55	5.16	2.92			1.12	3.89	5.68	12.13
7479		8.30	7.95	3.26			1.26	3.45	5.70	13.12
7943		8.67	7.76	3.56			2.06	3.76	4.89	13.55
7800		9.24	6.64	2.76			1.40	4.18	4.77	12.87
7931		9.58	6.31	2.50			1.16	4.68	5.00	12.81
7929		9.21	6.91	3.16			1.72	4.32	5.07	12.58
7926		10.16	7.88	3.51			1.42	3.51	4.65	13.40
9134		9.03	5.07	2.74			2.28	5.17	6.49	13.91
9122		10.08	4.71	2.42			2.03	4.96	6.45	13.19
9129		8.15	5.47	3.03			2.37	4.70	6.44	13.99
9124		9.07	6.84	2.78			1.21	3.88	5.01	12 72
9178		9.08	7.63	3.39			1.18	3.58	5.03	12.07
9177		8.10	7.40	3.38			1.49	4.49	5.88	12.92
9172		9.29	8.47	3.16	3.34	0.32	1.40	4.15	5.43	12.51
7972		8.78	7.29	3.22			2.01	3.56	5.36	13.41
7988		8.81	9.80	3.63	4.30	0.36	1.35	4.04	6.06	13.95
7978		9.69	7.21	3.40			1.31	4.29	5.88	13.23
7976		7.62	7.86	3.64			1.52	4.20	5.43	14.39
9230		8.38	9.54	3.74	4.12	0.54	0.92	3.85	5.10	11.91
7737		9.73	6.33	2.90			1.79	4.10	5.56	12.70
7738		9.68	7.71	3.66			1.35	3.93	4.92	13.19
7739		9.73	8.19	3.44	3.10	0.24	1.74	3.75	5.20	12.42
7730		8.31	6.86	3.26			1.95	5.36	7.27	13.93
7729		9.57	7.96	3.42			1.36	4.01	5.25	12.55
7728		10.42	7.80	2.91			1.01	3.74	4.67	11.70
7632		8.55	7.01	3.53			1.31	3.02	4.27	12.77
7736		8.97	6.95	3.06			1.47	3.88	5.22	13.14
7461		8.31	7.61	3.25			1.03	4.90	3.29	11.96
7733		9.77	6.31	2.76			1.69	3.92	5.48	12.64

TABLE XIV.— CONTINUED.

Station No.		Moisture.	Ash.			Lime (CaO.)	Ether extract.		Alcohol extract.	Cold water extract.
			Total.	Soluble in water.	Insoluble n HCl.		Volatile.	Non-volatile.		
7725	Not found Adulterated.	9.91	7.88	4.10			2.05	5.12	5.87	14.92
7447		9.21	8.39	3.45	3.18	0.60	0.70	4.08	5.58	12.39
7726		9.78	5.19	2.30			1.48	4.49	5.66	12.84
7734		9.52	7.16	2.95			1.61	3.87	5.42	11.58
7454		8.41	7.02	3.01			1.03	3.64	5.18	13.93
7995		9.73	5.34	2.98			1.00	3.24	4.45	13.27
7990		9.82	7.33	3.24			1.25	4.03	5.28	12.51
9119		8.93	8.89	3.26	3.41	0.32	1.53	3.93	5.38	12.73
9111		9.44	7.01	2.53			1.53	4.36	6.35	12.32
9113		9.50	7.14	3.10			1.65	4.16	5.56	12.88
9137		8.68	4.67	2.51			1.78	4.76	5.90	13.43
9156		8.21	7.71	3.63			1.16	3.88	5.74	12.20
9153		9.04	5.98	2.73			1.60	4.56	5.79	12.84
9152		9.29	5.81	3.53			1.59	3.89	5.45	13.60
7754		8.75	5.83	2.99			2.22	4.64	5.98	14.00
7763		9.14	7.75	3.49			1.80	4.47	5.77	11.60
7757		9.33	8.25	3.58	2.59	0.62	1.25	3.75	4.89	12.58
7966		8.61	9.24	3.24	3.64	0.44	1.89	3.43	5.11	12.14
7969		9.55	4.83	2.64			1.70	4.03	5.42	12.66
9409		9.05	5.82	3.01			1.22	3.37	6.84	
7767	Adulterated.	8.87	4.58	2.22			1.03	6.49	7.71	11.62
7792		9.31	7.18	2.98			1.37	4.80	6.37	13.10
7781		9.01	5.55	3.17			1.54	5.11	5.95	13.06
9033		7.88	5.82	2.85			1.61	4.35	6.26	11.30
9157		9.15	5.59	2.19			1.67	4.51	6.08	12.34
9235		8.55	19.26	5.57	1.27	*6.34	1.46	3.70	6.28	19.13
7953		8.53	5.85	2.38			1.15	4.15	5.47	11.53
7939		7.29	7.82	2.99	3.09	0.42	1.83	6.47	9.40	14.02
7798		7.00	10.23	3 21	2.92	0.64	1.32	8.49	9.88	18.41
7732		9.45	5.63	2.18			0.76	3.54	5.08	12.23
7735		7.84	5.77	2.26			1.24	4.02	5.71	13.04
7633		8.31	5.55	2.34			1.59	5.97	7.78	15.00
7465		8.12	5.61	2.18			1.39	6.56	8.43	15.42
7984		10.09	5.16	2.41			0.50	5.51	7.35	14.68
7980		9.11	10.37	6.25	.64	†2.72	1.33	4.44	5.67	16.09
7998		8.55	8.00	3.09	2.57	0.16	0.31	6.92	9.25	15.02
9104		8.82	5.19	2.15			1.80	6 44	8.21	12.34
9115		8.54	6.82	2.41			0.56	7.13	9.11	14.42
9143		9.31	7.62	2.48			0.61	3.28	4.65	11.06
9148		8.79	3.77	1.56			0.26	1.27	3.50	20.18
9147		8.58	9.35	4.12	3.55	0.36	0.98	4.15	5.18	12.88
7747		9.47	12.31	6.07	1.98	‡2.72	1.69	3.61	5.42	15.89
7740		9.13	4.70	2.77			1.35	3.46	4.68	13.53
7960		9.50	6.78	2.95			1.41	3.71	5.79	12.79

* SO_3 9.25. † SO_3 3.60. ‡ SO_3 3.56.

SALICYLIC ACID IN MALT LIQUORS.

By A. L. Winton.

Forty samples of lager beer and seven of ale, all of which were purchased in New Haven, have been tested for salicylic acid.

The results may be summarized as follows:

	In Labeled Bottles.	In Rubber Stoppered Bottles, Not Labeled.	Drawn from the Wood.	Total.
Lager Beer —				
Salicylic acid, not found,	19	8	2	29
Salicylic acid, found,	3	8	0	11
Total,				40
Ale —				
Salicylic acid, not found,	3	1	2	6
Salicylic acid, found,	0	1	0	1
Total,				7

The method used for detecting salicylic acid was as follows:

Method of Testing for Salicylic Acid.— Twenty-five to fifty cc. of the liquor to be tested are acidified with sulphuric acid and the mixture thoroughly shaken in a tube of suitable size with an equal bulk of ether. The ethereal solution is carefully decanted into a flat porcelain dish and the ether evaporated at a gentle heat. The residue is dissolved in absolute alcohol and tested with ferric chloride solution.

Descriptions of the samples of beer and ale not found to contain salicylic acid are given in Tables XV and XVI, and of those found to contain this preservative in Table XVII.

The sample of ale found to contain salicylic acid was bought of W. J. Boettger, 215 Shelton Avenue, and was stated by the dealer to have been brewed by Feigenspan.

TABLE XV. LAGER BEER NOT FOUND TO CONTAIN SALICYLIC ACID.

Station No.	Brand.	Dealer.
	In Labeled Bottles.	
7690	Rochester Brewing Co.'s Bohemian,	Free & Waag, 725 State St.
7691	Rochester Brewing Co.'s Premier,	Free & Waag, 725 State St.
7692	Rochester Brewing Co.'s Standard,	Free & Waag, 725 State St.
7693	Rochester Brewing Co.'s Extra Dark Bavarian,	Free & Waag, 725 State St.
7586	Gabriel Sedlmayr München, Versandt Bier,	Edw. E. Hall & Son, 770 Chapel St.
7591	The Bergner & Engel Co , Phila., Tannhaeuser Bier,	Edw. E. Hall & Son, 770 Chapel St.
7590	Beadleston & Woerz, Imperial German Brew,	Edw. E. Hall & Son, 770 Chapel St.
7588	Beadleston & Woerz, Imperial Beer, Gold Label,	Edw. E. Hall & Son, 770 Chapel St.
7589	Rochester Brewing Co., Extra Dark Bavarian,	Edw. E. Hall & Son, 770 Chapel St
7587	Jos. Schlitz Brewing Co , Celebrated Milwaukee Beer,	Edw. E. Hall & Son, 770 Chapel St.
7594	Pabst Bohemian, Milwaukee,	Edw. E. Hall & Son, 770 Chapel St.
7593	Bürgerbräu, Würzburg, Bavaria (Dark),	Edw. E. Hall & Son, 770 Chapel St.
7596	Brauerei zum Augustiner, München,	W. H. Jensen, 47 Church St.
7685	Jos. Schlitz Brewing Co.'s Celebrated Milwaukee Lager Beer,	Hugh J. Reynolds, 152 Crown St.
7686	Jos. Schlitz Brewing Co.'s Extra Pale Milwaukee Beer,	Hugh J. Reynolds, 152 Crown St.
7687	Jos. Schlitz Brewing Co.'s Münchener,	Hugh J. Reynolds, 152 Crown St.
7600	Pschorr-Bräu, München,	Hugh J. Reynolds, 152 Crown St.
7688	Aktien-Brauerei zum Löwenbräu München, Export Bier,	Chas. Scholl, 156 Crown St.
7703	Chr. Feigenspan's Export Beer, Newark,	C. Shanley, 245 Congress Ave.
	*In Rubber Stoppered Bottles, Not Labeled.**	
7689	J. Ruppert's,*	J. P. Baldwin, 450 State St.
7705	Ulmer,*	W. J. Boettger, 215 Shelton Ave.
7704	The Springfield Brewing Co.,*	J. P. Carney, 169 Meadow St.
7702	Weibel's,*	Jos. Fappiano.
7697	Weidemann's,*	Fontaine & Heidrich, 231 Cong Av.
7599	Toledo,*	W. Ihne, 66 Crown St.
7716	Quinnipiac,*	Quinnipiac Brewing Co.
7709	F. & M. Schaefer, N. Y., Culmbacher,*	Geo. Stalze, 905 State St.
	Drawn from the Wood.	
7717	Narragansett,*	W. Scanlon, 142 Ashmun St.
7723	Rochester,*	J. P. Donnelly, 174 Ashmun St.

* The brand or maker's name was given by the dealer.

Table XVI. Ale Not Found to Contain Salicylic Acid.

Station No.	Brand.	Dealer.
	In Labeled Bottles.	
7707	Bass & Co.'s White Label,	John C. Doody, 239 Water St.
7696	Bass & Co.'s Pale Ale,	Wm. Henchy, 254 Congress Ave.
7715	Quinnipiac Brewing Co., Pale Ale,	Quinnipiac Brewing Co.
	In Rubber Stoppered Bottles, Not Labeled.	
7714	Quinnipiac Brewing Co., Still Ale,*	Quinnipiac Brewing Co.
	Drawn from the Wood.	
7713	Ballentine's Ale, Newark,*	Patrick Lee, 166 Ashmun St.
7712	H. Clausen & Son Ale, New York,*	R. E. Wartmann, 134 Starr St.

* As stated by the dealer.

Table XVII. Beer Found to Contain Salicylic Acid.

Station No.	Brand.	Dealer.
	In Labeled Bottles.	
7694	Rochester Brewing Co., Rienzi,	Free & Waag, 725 State St.
7598	Springfield, Mass., Brewing Co., Gold Medal Tivoli,	Gilbert & Thompson, 918 Chapel St.
7592	Rochester Export Lager Bier,	Edw. E. Hall & Son, 770 Chapel St.
	In Rubber Stoppered Bottles, Not Labeled.	
7701	Fresenius Standard Lager Beer,*	Thos. A. Kean, 285 Water St.
7698	Fresenius Lager Beer,*	Jos. A. Miller, 404 Congress Ave.
7595	Narragansett Lager Beer,*	Chas. Scholl, 156 Crown St.
7700	Feigenspan's Lager Beer,*	Otto A. Scholz, 45 Bristol St.
7711	Liebmann's Lager Beer,*	Geo. W. Shea, 143 Newhall St.
7708	F. & M. Schaefer, N. Y., Wiener Beer,*	Geo. Stelzle, 908 State St.
7710	F. & M. Schaefer, N. Y., Lager Beer,*	Geo. Stelzle, 908 State St.
7699	Bachmann's Lager Beer,*	Aug Wilhelm, 88 Ashmun St.

* Statement of dealer.

SAUSAGE.

By A. L. Winton and W. L. Mitchell.

In the report for 1897, page 41, will be found descriptions of forty-two samples of sausage purchased during the months of October, November, and December, 1896. Twenty-seven of these samples were found to contain borax.

Nineteen samples, purchased December 8 to 17, 1897, have been examined, not only for borax but also for starch, the principal ingredient of various preparations of Indian corn, potatoes, and wheat, which are used in sausage as absorbents. As it is said that these starchy materials serve not merely to absorb the juices of the meat but also water, which is added as a "filling," the percentage of water in each sample was determined. (See Table XVIII.)

Fourteen of the samples contained borax and ten of them starch, which, in eight cases, was derived from Indian corn, in one from both Indian corn and potatoes, and in one from wheat. The average percentage of water in the samples containing starchy material was 42.40, in the other samples 40.13. This difference is too small to fully warrant the conclusion that the starchy material had been added for the purpose of holding water as a make-weight.

Table XVIII. Sausage.

Station No.	Brand.	Dealer.	Price per Pound, Cts.	Preservative.	Water.	Starch.
		Bridgeport:				
9018	World's Food Fair Bag Sausage, North Pack. & Prov. Co., Boston,	Bridgeport Pub. Market, 39 Bank St.,	12½	Borax	40.70	.....
9019	Peerless P'k Sausage, Jersey City,*	Bridgeport Pub. Market, 39 Bank St.,	12	Borax	44.07	Corn
9021	Plumb & Winton Co.'s Sausage,*	B. Liebscher, 652 Main St.,	10	.....	34.95	.....
9020	Sperry & Barnes' Sausage,*	Village Market, Main St.,	10	Borax	43.77	Corn
		Greenwich:				
9234	Made by dealer,*	H. B. Marshall & Co.,	14	.....	41.46	.....
		Hartford:				
9089	Hunt's Sausage Meat, A. C. Hunt & Co., Springfield, Mass.,	City Market, 487 Main St.,	10	Borax	36.42	Corn
9088	Springfield Sausage,*	A. C. Hart & Co., Albany Ave.,	10	Borax	37.88	Corn
		Meriden:				
9246	Meriden Provision Co.'s Home Made Sausage,	A. W. Gardner, 43 E. Main St.,	10	Borax	44.41	.....
9247	Made by dealer,*	C. F. Fox, 90 W. Main St.,	12	Borax	48.68	Corn & potato
		Middletown:				
9270	Sperry & Barnes' Sausage,*	Bacon & Co., 480 Main St.,	10	.....	31.41	Wheat
9269	Made by dealer,*	Wm. Jamieson, 290 Main St.,	10	.....	36.64	.....
		New Haven:				
9213	Armour's Sausage,*	N. Haven Pub. Market, 390 State St.,	8	Borax	42.88	.....
9210	Boston Sausage,*	N. Haven Pub. Market, 390 State St.,	9	Borax	45.84	Corn
9214	Handy's Sausage,*	N. Haven Pub. Market, 390 State St.,	10	Borax	43.74	Corn
9212	Merwin's Sausage,*	N. Haven Pub. Market, 390 State St.,	10	Borax	39.38	.....
9211	Peerless Sausage,*	N. Haven Pub. Market, 390 State St.,	12	Borax	47.50	Corn
		New London:				
9266	The G. H. Hammond Co.'s Coin Special Breakfast Sausage,	Market, 20 Main St.,	12	Borax	45.73	Corn
9268	Small Sausage, North Star Brand,	Market, 46 Main St.,	15	Borax	44.51	.....
		Norwich:				
9267	Made by dealer,*	Gardner & Reynolds, 4 Market St.,	10	.....	36.39	.....

* Statement of dealer.

EXAMINATION OF HONEY.

By A. W. Ogden.

Thirty-seven samples of strained honey have been examined. Of these, five are probably pure; twenty-two may be genuine, though they seem to be made by bees fed somewhat with cane sugar, or to have had invert sugar added to them; two unquestionably contain cane sugar added as an adulterant, and *eight* are adulterated with glucose syrup.

The details regarding these samples appear in Tables XIX and XX.

METHOD OF ANALYSIS. — One-half the normal quantity for polariscopic test* is dissolved in water and clarified when necessary with 1^{cc} each of alum cream and basic lead acetate solution. After making up the volume to 100^{cc} and filtering, the solution is polarized in a 200^{mm} tube. 50^{cc} of the solution are treated with 5^{cc} of strong hydrochloric acid, heated at 68° to 70° C. for ten minutes and polarized a second time, after inversion.

The results in the table are calculated in all cases to the normal quantity.

TABLE XIX. —

Station No.	Label.	Manufacturer or Producer.
	Probably Pure.	
9046	Choice Honey,	C. A. Stanton, Newington, Conn.
9067	One Pound Pure Honey,	Said to be native.
9063	Pure Extracted Honey. From the apiary of	W. E. Close, Stanwich, Conn.
9345	Pure Extracted Honey. From the apairy of	Geo. J. Francis, Durham, Conn.
9068	2 lbs. Pure Machine Extracted Honey. From the apiary of	Irving M. June, Riverbank, Conn.
	Possibly from Bees fed with Sugar, or with Invert Sugar added.	
9025	Pure Honey,	Wm. T. Gregory, Cranbury, Conn.
9035	Strained Honey,	F. H. Leggett & Co., New York.
9041	Pure White Clover Honey,	W. J. Lamb.
9043	Busy Bee Brand, Pure Strained Honey,	Hudson Mfg. Co , 61 Hudson St., N. Y.
9380	Pure Honey, gathered from White Clover,	F. H. Strever, Pine Plains, N. Y.
9051	Health Brand, Pure Strained Honey.	Lewis DeGroff & Son, New York.
9055	Pure Strained Honey. Guaranteed Free from adulteration,	Falcon Packing Co., New York.
9100	Pure Strained Honey,	F. C. Gould, East Hartford, Conn.
9238	Strained Honey,	F. H. Leggett & Co., New York.
9253	Pure Honey. With a bee as trade-mark,	None given.
9262	½ lb. Pure Honey (blown in glass),	None given.
9250	Pure White Clover Honey,	Brownell & Field Co., Providence, R. I.
9249	Choice Honey, Warranted,	None given.
9336	None. Piece of comb in it,	None given.
9349	Strictly Pure Honey,	Whitcher, Pillman & Co., Ayer, Mass.
9341	Pure Extracted Honey. From the apiary of	Geo. J. Francis, Durham, Conn.
9339	Pure Extracted Honey, Eagle Brand,	None given.
9281	Chas. McCulloch & Co., Wholesale Commission, Albany,	E. E. Harris, North Petersburg, N. Y.
9287	None. In pint Mason jar,	None given.
9307	Fancy California Honey,	C. T. Joslyn Co., Malden, Mass.
9291	None. Piece of comb in it,	None given.
9309	Pure Honeysuckle Honey,	W. J. Lamb.

* 13.024 grams.

Strained Honeys.

Dealer.	Price per Package.	Polarization.			
		Direct.		After Inversion.	
		Degrees.	Temperature C.	Degrees.	Temperature C.
Bridgeport. — Bridgeport Public Market,	.20	—0.1	24.0	—15.7	21.7
Greenwich. — Avery & Wilson,	.25	—4.3	23.7	—11.8	23.7
L. Timmons,	.25	—0.5	22.3	—17.9	23.0
Middletown. — A. M. Bidwell,	.30	—9.7	26.0	—12.4	25.4
Stamford. — W. W. Waterbury,	.32	—8.7	22.4	—14.0	21.5
Bridgeport. — Coe & White, 560 Main St.,	.15	—10.9	22.0	—15.1	23.0
Logan Bros., 863 Main St.,	.20	—12.7	25.5	—20.4	24.3
C. H. Stevens, 398 East Main St.,	.20	—16.7	23.0	—19.5	22.2
R. T. Whiting, 345 Main St.,	.25	—16.3	22.0	—16.8	22.0
Canaan. — Jackson & Eggleston,	.25	—10.3	24.3	—16.1	24.7
Greenwich. — Knapp & Studwell,	.20	—15.7	22.0	—19.3	22.0
J. L. Mahoney,	.20	—14.5	23.0	—17.9	23.0
Hartford. — Barrows & Thalhiemer, 525 Main,	.15	—16.7	23.0	—22.3	23.0
H. J. Case & Co., 433 Main St.,	.25	—12.5	23.2	—18.4	22.6
Meriden. — L. C Brown, 4 West Main St.,	.18	—15.7	25.3	—19.0	25.3
Kimball & Hugins, 31 East Main St.,	.15	—16.3	24.0	—19.9	22.2
N.Y. Butter & Grocery House, 2 Colony,	.15	—16.3	23.0	—21.9	23.5
J. J. Pagnam, 35 West Main St.,	.15	—10.3	23.0	—14.4	23.3
Middletown. — C. A. Allison, 31 Main St.,	.20	—17.1	23.0	—21.7	22.0
Cottage Market, Main St ,	.10	—18.9	21.5	—22.8	20.3
W. K. Spencer, Main St.,	.35	—10.1	25.4	—12.9	25.2
W. K. Spencer, Main St.,	.20	—14.7	22.0	—18.8	21.0
New London. — Daboll & Freeman,	.20	—11.7	25.8	—14.6	25.1
T. W. Potter, 72 State St.,	.28	—16.5	22.0	—20.1	22.6
Norwich. — H. I. Palmer, Main St.,	.20	—11.5	25.0	—17.5	25.0
G. A. Ray, 47 Shetucket St.,	.18	—18.8	24.5	—21.9	24.0
J. A. Stoddard, 100 Franklin St.,	.25	—14.3	25.2	—19.5	20.3

TABLE XX.

Station No.	Label.	Manufacturer or Producer.
	Contain Cane Sugar.	
9047	Echo Brand Clover Honey, Guaranteed Pure,	Aero Distilled Water Co., Bridgeport.
9045	Echo Brand Clover Honey, Absolutely Pure,	Aero Distilled Water Co., Bridgeport.
	Consist of or Contain Glucose Syrup.	
9024	*Choice Comb Honey,	Wm. Thompson, Wayne Co., N. Y.
9040	*Choice Comb Honey,	Wm. Thompson, Wayne Co., N. Y.
9026	No Label. Said to be	Deforth Bros., 41 First Ave., New York.
9277	Pure Strained Honey, F. H. Leggett & Co., Prop.,	Crystal Conserve Co., New York.
9288	White Clover Honey,	West Virginia Preserving Co., Wheeling.
9072	*Choice Extracted Honey,	Thomas Waters, Worcester, N. Y.
9074	White Clover Honey,	West Virginia Preserving Co.
9077	Extra Quality Pansy Brand Honey,	Not given.

* We have added a little crystal syrup with our honey to prevent granulation, which we guarantee perfectly pure and wholesome.

EXAMINATION OF MAPLE SYRUP.

By A. W. Ogden.

Three samples of maple syrup have been examined, and all were found to be free from adulteration with glucose. The samples were the following:

7884. "Vermont Maple Syrup, Vermont Maple Sugar and Syrup Co., New Haven, Conn." Bought of P. Jente & Bro., 107 Broadway, New Haven.

9606. Warranted Pure Vermont Maple Syrup. Stoddard, Gilbert & Co., New Haven, Conn.

9607. Gold Leaf Brand Pure Vermont Maple Syrup. Huntington Maple Syrup and Sugar Co., Maple Groves, Huntington, Vt.

MILK EXAMINED FOR NEW HAVEN MILKMEN.

By A. W. Ogden and W. L. Mitchell.

A New Haven city ordinance, passed in 1897, establishing a milk standard, was the means of awakening unusual interest among milk producers and dealers in the composition of the

STRAINED HONEYS.

Dealer.	Price per Package.	Polarization. Direct. Degrees.	Direct. Temperature C.	After Inversion. Degrees.	After Inversion. Temperature C.	Per cent. Sucrose by Polarization.
Bridgeport. — Bridgeport Public Market,	.25	30.9	22.5	—19.5	22.5	38.0
Centennial Tea Co.,	.15	22.3	21.3	—20.6	22.0	32.6
Bridgeport. — D. O'Donnell, 628 Main St.,	.10	82.9	24.6	78.4	23.5	....
The Village Market, Main St.,	.10	106.7	23.5	102.3	23.5	....
R. Wundrack, 575 Main St.,	.12	107.7	24.0	104.2	25.3	....
New London. — Keefe & Davis, 125 Bank St.,	.20	66.5	25.0	63.0	21.5	....
T. W. Potter, 72 State St.,	.10	125.5	22.0	121.3	21.5	....
Stamford. — W. W. Edwards, 99 Main St.,	.15	88.1	25.4	83.9	24.2	....
J. F. Maher, 7 Pacific St.,	.12	126.5	24.0	123.3	24.0	....
N. Y. Grocery Co., Main St.,	.10	127.1	24.0	123.8	24.0	....

milk which they sold, and since that time ninety-six samples have been sent to the Station for examination by dealers.

The Station has no guarantee that the samples were properly drawn, but as they were submitted for the private information of the senders, it is not likely that they were intentionally unfair samples.

The results of the examinations may be summarized as follows:

Month.	Total Solids. Per Cent. No. Samples.	Average.	Highest.	Lowest.	Butter Fat. Per Cent. No. Samples.	Average.	Highest.	Lowest.
1897								
December,	11	13.24	14.73	12.41	15	4.34	5.20	3.80
1898								
January,	13	13.11	14.32	12.06	21	4.19	5.35	3.20
February,	6	12.59	13.13	11.88	12	4.27	7.30	3.50
March,	6	13.68	14.31	12.66	9	4.49	5.20	3.40
April,	7	13.25	14.43	12.93	8	4.79	4.85	3.85
May,	8	12.98	14.03	11.55	13	4.70	5.35	3.60
June,	1	12.06	... .	.....	7	4.16	4.60	3.90
July,	..	.....	.....	.....	6	4.45	5.10	3.80
August,	..	.....	.....	.....	..	...	....	....
September,	1	13 60	....	.....	4	4.59	5.00	4.00
Total and Average,	53	12.90	14.73	11.55	95	4.40	7.30	3.20

MILK DELIVERED AT A PUBLIC INSTITUTION.

By A. W. Ogden and W. L. Mitchell.

The contents of six forty-quart cans were carefully sampled by an agent of the Station as they were delivered at 5 A. M. by the milkman to the institution. The milk in the several cans contained the following percentages of fat: 5.30, 4.90, 3.75, 4.15, 4.60, and 3.50. The milk was, therefore, of good quality, though the contents of two cans fell below the seller's guarantee of four per cent. of butter fat. It is evident that the whole quantity of milk delivered, if mixed, would contain over four per cent. (about 4.36 per cent.).

From these cans milk is poured off for kitchen uses, and also for the table use of the inmates.

The milk sent up for table use in different parts of the institution, on the day when the milk supply was examined, contained the following percentages of fat: 4.2, 3.2, 3.6, 3.45, 3.5, 3.9, and 3.8.

It would appear that rather less butter fat is in the milk served at meals than is in the milk as it is delivered. Those in charge are instructed to stir the milk thoroughly each time before pouring from the can, but evidently a perfect mixture is not obtained.

CREAM.

By A. W. Ogden and W. L. Mitchell.

Seven samples of cream, sent to the Station for examination by private individuals, contained on the average 21.41 per cent. of butter fat, the percentages ranging from 18.9 to 26.75.

Two samples of concentrated cream contained 33.75 and 37.75 per cent. of butter fat respectively.

Fourteen samples of fresh cream not found to contain borax, were bought by the Station agent of the following dealers:

Station No.		
9163	*Danbury*,	East Canaan Creamery, 47 White St.
7938	*Hartford*,	Allen Bros., Main and Sheldon Sts.
7945		J. P. Guilfoil Co., 193 Asylum St.
7948		G. F. Kellogg, 123 Ann St.
7921	*Meriden*,	D. Higgins, 17 Butler St.
9175	*Naugatuck*,	The Grant Grocery Co.

Station No.		
7731	*New Haven*,	S. J. Burt, 894 State St.
7855		J. T. Pohlman, 140 Dixwell Ave.
7724		A. Tenant, 751 State St.
7727		W. E. Waterbury, 774 State St.
7987	*New London*,	T. W. Potter, 72 State St.
7975		Thomas & Gumble, 437 Bank St.
9101	*Norwich*,	W. A. Smith, 137 Main St.
7964	*Willimantic*,	Purinton & Reade, 717 Main St.

Four samples of fresh cream contained borax. These were the following:

7761, 7762. Two samples labeled on paper cap: "Goshen Farm Co. Pure Cream, Goshen, Conn." Dealers, Simon Bohl, 88 S. Main St., and the Waterbury Grocery Co., 165 Bank St., Waterbury. Price, 10 cents per half pint.

7849. Dealer, J. C. Kelley, Dixwell and Munson Sts., New Haven. Price, 10 cents per half pint.

7851. Dealer, C. Kipp, Dixwell Ave. and Henry St., New Haven.

The following brands of canned cream were found to contain neither borax, salicylic acid, nor benzoic acid:

7924. "Butler's Brand Condensed Cream." Dealer, Russell Bros., 2 Colony St., Meriden. Price, 10 cents per can.

7857. "Borden's Peerless Brand Evaporated Cream." Dealer, I. B. Chandler, 101 Dixwell Ave., New Haven. Price, 12 cents per can.

9106. "St. Charles Evaporated Cream." Dealer, H. D. Avery, 202 Franklin St., Norwich. Price, 15 cents per can.

9110. "Imperial Brand Cream, Anglo-Swiss Condensed Milk Co." Dealer, A. C. Stetson, Putnam. Price, 20 cents per can.

7967. "Highland Brand Evaporated Cream, Helvetia Milk Condensing Co." Dealer, H. C. Hall, Willimantic. Price, 15 cents per can.

CANNED SOUPS.

Thirty-two samples of canned soups were examined by Messrs. Winton, Ogden, and Mitchell to detect any chemical preservative, and in all cases with negative results.

The samples were as follows:

7923. Anderson's Concentrated Tomato Soup. Anderson

Preserving Co., Camden, N. J. Dealer, Russell Bros., 2 Colony St., Meriden. Price, 10 cents per can.

7908, 7909, 7910. French Soups. Franco-American Food Co., New York. Dealer, P. Jente & Bro., 107 Broadway, New Haven. Price, 35 cts. per quart can.

7903 to 7907. White Label Soups. Armour Packing Co., Kansas City. Dealer, P. Jente & Bro., 107 Broadway, New Haven. Price, 23 cents per quart can.

7860 to 7871. French Soups. Franco-American Food Co., New York. Dealer, E. E. Hall & Son, 770 Chapel St., New Haven. Price, 20 cents per pint, and 32 cents per quart cans.

7872 to 7882. Huckins' Soups. J. H. W. Huckins & Co., Boston. Dealer, S. W. Hurlburt, 1074 Chapel St., New Haven. Price, 25 cents per quart can.

CHILI SAUCE.

9375. "Heinz's Chili Sauce. Keystone Brand. H. S. Heinz, Pittsburg." Dealers, S. L. Parsons & Son, Canaan. Price, 25 cents per bottle. Contained *eosine* (a dye much used in red ink) and *salicylic acid.*

CANNED VEGETABLES.

Twenty-three samples of canned peas, twenty-five of corn, seven of string beans, three of lima beans, and seven of succotash (lima beans and corn) were examined by Messrs. Winton, Ogden, and Mitchell, for preservatives. Sulphurous acid was present in small amount in some of the samples of canned corn, but other than this, no preservative was detected.

MINCE MEAT.

Nine samples of mince meat were examined by Messrs. Winton, Ogden, and Mitchell, to detect the presence of salicylic

and boric acids, but in every case with negative results. The samples were as follows:

TABLE XXI.—MINCE MEAT NOT FOUND TO CONTAIN SALICYLIC OR BORIC ACIDS.

Station No.	Brand.	Dealer.	Price per package.
9167	Health Brand Mince Meat, Lewis DeGroff, New York, . .	*Danbury.* Mastin & Co., 54 White St.,	10
7858	Columbia Condensed Mince Meat, Gutchess Bros., Port Byron, N. Y.,	*New Haven.* C. T. Downes & Sons, 1 Broadway, .	9
7805	The Old Homestead Condensed Mince Meat, Libby, McNeill & Libby, Chicago, ...	Philip Hugo, 28 Edwards St.,	10
7911	None Such New England Mince Meat, Merrell-Soule Co., Syracuse, N.Y.,	P. Jente & Bro., 107 Broadway,	9
7820	Condensed Mince Meat, Armour & Co., Chicago, . . .	Kohn Bros., 55 George St.,	10
7822	New England Condensed Mince Meat, T. E. Dougherty, Chicago,	D. M. Welch & Son, 28 Congress Ave.,	10
7758	The Superb Mince Meat, Hudson Valley Preserving Co., Glens Falls, N. Y., ...	*Waterbury.* Dixon & Sanson, 328 Washington St.,	10
7749	Imperial Condensed Mince Meat, Gutchess Bros., Port Byron, N. Y.,	E. J. Upson, 841 N. Main St.,	10
7370	The Unequalled Mince Meat, E. Harrison, Glens Falls, N. Y.,	*Willimantic.* Burt Thompson, 798 Main St.,	10

GROUND SPICES IN SEALED AND LABELED PACKAGES.

By A. L. Winton and W. L. Mitchell.

Of 332 samples of spices sold *in bulk* which have been examined at this Station during the past three years, 127, or 38.3 per cent. of the whole number, have been found adulterated. If samples of mustard colored with turmeric are included, the number of adulterated samples will be increased to 138, or 41.5 per cent. of the whole number examined.

As the purchaser has no ready means of distinguishing between the pure and the adulterated, his only safe course is to buy spices in *sealed packages, bearing the name of a reliable house whose goods have not been found adulterated.*

In Table XXII are given the results obtained in the examination of all the brands of mustard, black pepper, white pepper, cayenne pepper, cloves, allspice, cinnamon, and nutmeg which have been found on sale in this State in sealed and labeled packages. With the exception of 19 samples of black pepper collected in 1896, all of these samples have been collected and examined within the year covered by this report.

Results of examination of 25 samples of ginger sold in sealed and labeled packages will be found in Tables XI, XII, and XIV, pages 147–150.

The samples noticed in this report are the following:

Mustard,	26	samples.
Black pepper,	44	"
White pepper,	13	"
Cayenne pepper,	14	"
Cloves,	20	"
Allspice,	21	"
Cinnamon,	26	"
Nutmeg,	6	"
Total,	170	"

The methods of chemical analysis employed are described on pages 186 to 191.

A summary of the samples of ground spices examined at this Station during the past three years is as follows:

Summary of Examination of Spices.

1896–1899.

	Number of Samples Examined.	Number of Samples found Adulterated or "Compounded."	Per cent. of Samples Adulterated or "Compounded."
In bulk, . . .	332	138	41.5
In labeled packages,	242	57	23.5

TABLE XXII — SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Mustard.	
9295	Anco Spice Mills, N. Y., Perfectly Pure Mustard,	*Norwich.* A. Wilson, 58 Franklin St.,
9745	Augur, John P., New Haven, Crescent Mills, Pure Mustard,	*New Haven.* J. G. & J. W. Pohlman, 140 Dixwell Ave.,
9746	Bailey, C. A., Strictly Pure Mustard,	C. A. Bailey, 171 Dix'll Ave.,
9490	Bennett, Simpson & Peek, London, Double Strength Mustard,	*Waterbury.* The Hewitt Grocery Co., 20 N. Main St.,
9742	Born Bros., Erfurt, Germany, Born's Mustard,	*New Haven.* Greater N. Y. Del. & Prov. Co., 84 Cong. Ave.,
9431	Bushnell Co., The F. C., Absolutely Pure Mustard,	I. B. Chandler, 101 Dix'll Ave.,
9251	Butler, James, New York, Strictly Pure Mustard,	*Meriden.* N. Y. Butter & Grocery House, 2 Colony St.,
9476	Colburn Co., The A., Phila., Colburn's Mustard,*	*Hartford.* Boston Grocery Co., Main St.,
9427	J. Colman's Mustard, England,†	*New Haven.* G. J. Burt, 894 State St.,
9318	Daniels, Cornell & Co., Strictly Pure Mustard,	*Putnam.* J. E. Sullivan.
9508	Dean & Son, N.Y., Ardenter Mustard,	*Groton.* H. E. Marquardt.
9744	Durkee & Co., E. R., N. Y. Gauntlet Brand Mustard Flour,	*New Haven.* C. Kipp, 290 Dixwell Ave.,
9740	Farrington & Co., F. R., N. Y. & Boston, Imperial Mustard,	F. W. Miner, 61 Broadway,
9271	Gillies & Co., Edwin J., N. Y. Mustard, Absolutely Pure,	*New London.* A. E. Foster, 120 Main St.,
9477	Hills & Co., Gold Seal Mustard,	*Hartford.* Hills & Co., 372 Asylum St.,
9480	Keen's Mustard, Double Superfine, London,‡	Hills & Co., 372 Asylum St.,
9743	Leggett & Co., Francis H., N. Y., Best Mustard,	*New Haven.* C. T. Downes & Son, 1 Broadway,
9506	Lincoln, Seyms & Co., Hartford,	*Portland.* P. Sullivan,
9452	Slade Co., D. & L., Boston, Oxford Mustard, Absolutely Pure,	*New Britain.* Sovereign Trading Co., 282 Main St.,
9468	Stickney & Poor, Boston, Absolutely Pure Mustard,	*Forestville.* J. M. Todd,
9739	Stoddard, Gilbert & Co., New Haven, Pure Mustard,	*New Haven.* N. Francesconie, Congress Ave.,
9493	Sultana Spice Mills, A. & P. Mustard,	*Waterbury.* Atlantic & Pacific Tea Co., 31 E. Main St.,
9470	Union Spice Co., New York, Celebrated Mustard,	*Hartford.* Union Pacific Tea Co., 174 Asylum St.,
9459	Upson Bros., Absolutely Pure Mustard,	*Southington.* Upson Bros.,
9741	Welch & Son, D. M., Absolutely Pure Mustard,	*New Haven.* D. M. Welch & Sons, Congress Ave.,
9738	Genuine English Mustard,	B. Carari & Co., 123 Congress Ave.,

* "The finest compound for family or medicinal use."
† "Warranted to be the finest Mustard Compound."
‡ "This is an admixture in which no injurious ingredient is used."

Sealed and Labeled Packages.

Station No.	Price per pack.—cts.	Ounces in package.	A.	Ether extract.		Reducing matters by direct inversion calculated as starch.	"Starch" by diastase method.	Crude fiber.	Nitrogen × 6¼.	Remarks.
			Total.	Volatile.	Non-volatile.					
9295	12	4	6.76	0.61	21.10	5.22	1.92	1.67	39.56	Colored with turmeric.
9745	10	4	6.26	0.33	19.17	5.18	2.08	2.15	39.75	Not found adulterated.
9746	10	4	5.85	0.05	19.24	4.14	0.51	2.59	41.06	do
9490	15	4	6.21	1.33	18.04	3.78	0.84	2.58	40.93	do
9742	15	4	4.81	1.90	21.98	1.85	0.28	1.95	40.63	do
9431	9	4	6.88	0.00	21.53	4.77	0.96	3.41	38.63	do
9251	10	4	4.60	0.54	10.34	33.71	30.26	1.97	23.63	Wheat flour about 40%.§
9476	12	4	5.20	0.19	18.66	18.50	15.52	1.80	32.44	Wheat flour about 20%,§ turmeric.
9427	18	4	3.83	0.00	35.16	10.17	7.54	1.78	30.00	Wheat flour about 9%.§
9318	20	8	5.54	0.38	17.95	6.12	1.74	4.87	39.25	Not found adulterated.
9508	10	4	5.16	0.38	20.89	3.65	0.67	1.76	42.13	do
9744	10	4	5.23	0.34	21.26	3.11	0.84	1.61	42.13	Colored with turmeric.
9740	10	4	5.69	0.56	20.27	4.19	0.57	2.02	39.88	Not found adulterated.
9271	10	4	14.05	0.28	21.32	4.18	1.41	2.68	35.37	Sand 7.24%.
9477	15	4	5.09	0.26	17.42	4.86	1.57	2.59	43.56	Not found adulterated.
9480	15	4	3.92	0.00	34.65	8.87	7.03	1.85	31.00	Wheat flour about 8%.§
9743	10	4	5.61	0.27	27.64	2.97	0.28	1.58	36.63	Not found adulterated.
9506	12	4	7.35	0.86	26.18	4.23	1.12	2.26	35.63	do
9452	20	4	6.92	0.81	17.50	5.27	1.12	2.70	38.69	do
9468	10	4	5.58	0.51	20.37	4.77	1.18	3.17	39.81	do
9739	10	4	6.95	0.53	18.58	4.59	1.24	2.45	39.31	do
9493	10	2½	6.58	0.26	17.14	5.54	1.80	3.35	40.49	do
9470	10	2½	7.44	0.00	16.00	7.79	1.74	6.15	36.75	Colored with turmeric.
9459	15	4	5.36	0.00	28.10	3.55	0.67	2.54	37.13	Not found adulterated.
9741	7	2½	5.92	1.07	20.47	4.05	1.74	1.98	39.25	do
9738	10	4	6.05	0.67	18.44	4.55	0.95	2.48	39.44	do

§ Calculated from the percentage of starch (by the diastase method) assuming that mustard contains 1 per cent. and wheat flour 70 per cent. of starch.

TABLE XXII — SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Black Pepper.	
5590	Adams & Howe, N. Y., Pure Pepper.	*Danbury.* 79 White St.,
9467	Allyn & Blanchard Co., Hartf'd, Pepper.	*Southington.* Finch & Laity,
5573	Augur, John P., New Haven, Crescent Mills, Pure Pepper.	*Waterbury.* Foote & Westwood, W. Main St.,
5574	Austin, Nichols & Co., N. Y., Blue Ribbon Pure Black Pepper.	*Putnam.* George Farley,
5595	Barnum & Reed, Strictly Pure Pepper.	*Danbury.* Barnum & Reed, 307 Main St.,
5596	Battey & Son, L., Strictly Pure Pepper.	*Moosup.* L. Battey & Son,
5569	Bennett, Simpson & Co., London, Genuine Malabar Black Pepper.	*Waterbury.* Waterbury Grocery Co., 163 Bank St.,
5071	Bennett, Sloan & Co., N. Y., Pure Pepper.	*New Haven.* Geo. M. Coombs, 195 Whalley Ave.,
5567	Blanchard, O. H., Pepper.	*Willimantic.* H. Dillon,
5570	Boardman & Sons, Hartford, Pure Pepper.	*New Britain.* J. Kerrin, 62 North St.,
5577	Bryan, Miner & Read, New Haven, Ground Black Pepper, warranted pure.	*Derby.* P. McEnerney, Main St.,
5581	Bryan, Miner & Read, New Haven, Pure Black Pepper.	*Willimantic.* Holden Arnold,
9520	Bugbee & Brownell, Providence, Pure Black Pepper.	*Norwich.* A. T. Otis, 261 Main St.,
9425	Bushnell Co., The F. C., New Haven, Absolutely Pure Pepper.	*New Haven.* F. E. Hull, 399 Grand Ave.,
9252	Butler, James, N.Y., Compound Pepper	*Meriden.* N. Y. Butter & Grocery House, 2 Colony St.,
9415	Clark, Chapin & Bushnell, N. Y., Diamond Absolutely Pure Pepper.	*Ansonia.* W. H. Bronson, 234 Main St.,
9433	Colburn Co., The A., Phila., Choicest Shot Pepper.	*New Haven.* G. J. Burt, 894 State St.,
9509	Daniels, Cornell & Co., New London, Strictly Pure Pepper.	*Groton.* G. S. Avery,
9086	De Groff, Lewis, N.Y., Best Pepper.	*Stamford.* H. Sawyer Daskam,
5583	Durkee & Co., E. R., N. Y., XXX Pepper.	*Meriden.* Thomas Nolan, 250 Pratt St.,
9320	Exley, Watkins & Co., Wheeling, W. Va.	*Putnam.* Edward Mullan,
9233	Farrington & Co., F. R., N. Y. & Boston, Pure Black Pepper.	*New Haven.* S. S. Adams, 412 State St.,
9273	Gillies & Co , Edwin J., N. Y., Absolutely Pure Pepper.	*New London.* A. E. Foster, 120 Main St.,
9802	Hall & Son, E. E., Singapore Black Pepper.	*New Haven.* E. E. Hall & Son,
9482	Hills & Co., Gold Seal Pepper.	*Hartford.* Hills & Co., 372 Asylum St.,
9282	Hornick, E. P., N. Y., Pure Pepper.	*New London.* Wm. A. Holt, 50 Main St.,

SEALED AND LABELED PACKAGES — *Continued.*

Station No.	Price per package.	Ounces in package.	Ash.		Ether extract—non-volatile.	Crude fiber.	Remarks.
			Total.	Insoluble in HCl.(Sand).			
5590	10	4	5.93	..	8.34	14.48	Not found adulterated.
9467	10	2½	6.26	....	7.93	15.52	do
5573	10	4	3.90	....	7.65	10.90	do
5574	10	4	4.60	...	8.15	12.72	do
5595	12	4	4.68	....	6.62	13.53	do
5596	8	4	3.94	....	7.09	13.70	do
5569	10	4	4.65	....	8.09	12.84	do
5071	..	.	4.96	....	7.02	14.30	do
5567	10	4	4.71	....	7.26	13.10	do
5570	10	4	4.10	....	7.84	12.86	do
5577	10	4	4.17	....	7.30	12.70	do
5581	10	4	5.23	....	7.81	15.41	do
9520	10	4	3.91	....	7.77	7.64	do
9425	10	4	5.25	....	7.52	13.98	do
9252	15	8	4.65	....	5.68	16.25	Contains buckwheat and wheat products.
9415	10	4	4.26	....	8.98	10.08	Not found adulterated.
9433	15	*3½	7.61	....	7.07	14.51	do
9509	10	4	8.30	1.09	5.89	22.16	Contains dirt or pepper shells.
9086	10	4	6.54	....	9.37	16.76	Not found adulterated.
5583	10	4	5.75	....	7.62	12.84	do
9320	10	*2	5.86	....	7.35	16.44	do
9233	5	4	6.67	....	6.54	15.31	do
9273	10	4	11.38	5.21	7.84	16.27	Contains dirt or pepper shells.
9802	..	.	.....	...	....	.....	Not found adulterated.
9482	20	*2	4.49	....	7.12	11.52	do
9282	10	4	4.84	....	8.05	12.68	do

* In glass pepper-shaker.

TABLE XXII — SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Black Pepper — Continued.	
9803	Justice Mills, Absolutely Pure Black Pepper.	*New Haven.* Harry Leigh, 354 State St.,
9510	Leggett & Co., Francis H., N. Y., Best Black Pepper.	*Madison.* F. C. Dowd,
5576	Lincoln, Seyms & Co., Hartford, Pepper.	*Waterbury.* E. F. Platt, 37 E. Main St.,
5597	Lyon, C. H., Strictly Pure Pepper.	*New London.* C. H. Lyon, 42 Coit St.,
5591	Mansfield & Co., W. H., Pure Black Pepper.	*Putnam.* W. H. Mansfield & Co.,
5599	Palmiter, R. R., Excelsior Mills, Strictly Pure Pepper.	*Derby.* George M. Spring, 214 Main St.,
9285	Potter-Parlin Co., The, N. Y., Strictly Pure Pepper.	*New London.* T. W. Potter, 72 State St.,
5585	Powers & Co., Jas. G., N. Y., Red Shield Pepper.	*Norwich.* G. A. Ray,
5568	Slade Co., D. & L., Boston, Absolutely Pure Pepper.	*Willimantic.* Holden Arnold,
9450	Sovereign Trading Co., Pure Black Pepper.	*New Britain.* Sovereign Trading Co., 282 Main St.,
9207	Square Deal Mills, N. Y., Pure Pepper.	*New Haven.* S. S. Adams, 412 State St.,
9259	Stickney & Poor, Boston, Absolutely Pure Pepper.	*Meriden.* F. W. Miner, 213 Pratt St.,
9084	Stiff & Co., Wm. J., N. Y., Knickerbocker Pure Pepper.	*Stamford.* H. Sawyer Daskam,
9423	Sultana Spice Mills, A. & P. Pepper.	*New Haven.* Atlantic & Pacific Tea Co., 386 State St.,
5593	Swain, Earle & Co., Boston, Pure Pepper.	*Preston.* James M. Young,
9447	Tropical Mills, Boston, Select Compounded Pepper.	*Wallingford.* Laden Bros.,
9330	Union Pacific Tea Co., N. Y., Pure Sovereign Black Pepper.	*Putnam.* The U. P. Tea Co.,
9461	Upson Bros., Absolutely Pure Black Pepper.	*Southington.* Upson Bros.,
	White Pepper.	
9420	Augur, John P., New Haven, Crescent Mills, White Pepper, warranted pure.	*New Haven.* Conrad Rausch, Foster & Avon Sts.,
9219	Bennett, Simpson & Co., London, Genuine Tellicherry White Pepper.	Johnson & Bro., 411 State St.,
9517	Bugbee & Brownell, Providence, Pure White Pepper.	*Norwich.* H. I. Palmer, 231 Union St.,
9228	Farrington & Co., F. R., N. Y. & Boston, Pure White Pepper.	*New Haven.* S. S. Adams, 412 State St.,
9481	Hills & Co., Gold Seal White Pepper.	*Hartford.* Hills & Co., 372 Asylum St.,

SEALED AND LABELED PACKAGES — *Continued.*

Station No.	Price per package.	Ounces in package.	Ash.		Ether extract — non-volatile.	Crude fiber.	Remarks.
			Total.	Insoluble in HCl.(Sand).			
9803	8	8	.....	....	....	.....	Not found adulterated.
9510	10	4	5.16	....	6.91	11.76	do
5576	10	4	4.82	....	7.11	12.85	do
5597	10	4	3.97	....	6.76	12.23	do
5591	10	4	4.46	....	7.96	12.73	do
5599	12	4	5.87	....	8.06	12.60	do
9285	10	*3½	7.47	....	7.54	14.91	do
5585	9	4	5.88	....	8.33	14.50	do
5568	10	4	4.21	....	7.66	12.48	do
9450	10	4	5.55	....	6.81	12.63	do
9207	10	4½	6.96	....	7.58	14.25	do
9259	10	2½	4.50	....	7.64	10.94	do
9084	12	*2½	6.76	....	9.81	17.99	do
9423	10	2½	9.65	2.26	8.20	16.12	Contains dirt or pepper shells.
5593	10	4	4.22	....	7.32	12.80	Not found adulterated.
9447	10	3	6.46	...	5.20	17.40	Contains charred matter, mustard hulls, and some corn product.
9330	20	8	9.37	2.93	6.59	16.69	Contains dirt or pepper shells.
9461	10	4	5.09	....	6.76	11.93	Not found adulterated.
9420	10	4	2.25	....	6.12	3.23	Adulterated with a wheat product.
9219	15	4	1.18	....	7.46	2.46	Not found adulterated.
9517	12	4	1.39	....	7.88	6.49	do
9228	5	4	4.01	...	6.19	3.60	do
9481	20	2*	3.43	....	6.80	4.07	do

* In glass pepper-shaker.

TABLE XXII — SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	White Pepper — Continued.	
9475	Leggett & Co., Francis H., N. Y., Best White Pepper.	*Hartford.* Guilfoil Grocery Co., 184 Asylum St.,
9297	Leggett & Co., Francis H., N. Y., White Pepper.	*Norwich.* W. A. Church, 18 Market St.,
9061	Montanye & Co., W. H., N. Y., Positively Pure Pepper.	*Greenwich.* J. L. Mahoney,
9507	Powers & Co., Jas. S., N. Y., Red Shield White Pepper.	*New London.* Ed. Keefe, 495 Bank St.,
9524	Slade Co., D. & L., Boston, Absolutely Pure White Pepper.	*New Haven.* Philip Hugo, 26 Edward St.,
9293	Smith, Welcome A., The Finest White Pepper.	*Norwich.* Welcome A. Smith, 137 Main St.,
9471	Union Spice Co., N. Y., Celebrated White Pepper.	*Hartford.* Un. Pacific Tea Co., 174 Asylum St.,
9458	Upson Bros., Absolutely Pure White Pepper.	*Southington.* Upson Bros.,
	Cayenne Pepper.	
9464	Allyn & Blanchard Co., Hartford, Strictly Pure Cayenne.	*Southington.* Finch & Laity.
9312	Austin, Nichols & Co., New York, Hungarian Paprica, Sweet Pepper.	*Norwich.* A.T.Otis, 261 Main St.
9504	Bryan, Miner & Read, New Haven, Pure Cayenne.	*Portland.* C. A. Ahlquist.
9518	Bugbee & Brownell, Providence, Pure Cayenne Pepper.	*Norwich.* A.T. Otis, 261 Main St.
9512	Ellis, S. N., New London, Pequot Brand Cayenne Pepper.	*Groton.* H. E. Marquiat.
9274	Gillies Mills, N. Y., Absolutely Pure Cayenne Pepper.	*New London.* A. E. Foster, 120 Main St.
9478	Hills & Co., Gold Seal Cayenne.	*Hartford.* Hills & Co., 372 Asylum St.
9342	Lincoln, Seyms & Co., Hartford, Pure Cayenne.	*Middletown.* J. B. Patterson, 110 Main St.
9058	Montanye & Co., W. H., New York, Pure Cayenne.	*Greenwich.* J. L. Mahoney.
9421	Slade Co., D. & L., Boston, Absolutely Pure Cayenne.	*New Haven.* Conrad Rausch, Foster & Avon Sts.
9351	Stickney & Poor's Absolutely Pure Cayenne.	*Middletown.* G. E. Burr, 136 Main St.
9412	Stickney & Poor's Pure Cayenne.	*Ansonia.* D. M. Welch & Son, Main St.
9417	Thompson's Pure Cayenne.	W. H. Bronson, 234 Main St.
9489	Manufacturer not given, Ground Cayenne.	*Waterbury.* The Hewitt Grocery Co., 20 N. Main St.

Sealed and Labeled Packages.

Station No.	Price per package.	Ounces in package.	Ash.		Ether extract—non-volatile.	Crude fiber.	Remarks.
			Total.	Insoluble in HCl.(Sand).			
9475	13	4	1.16	....	7.77	0.53	Not found adulterated.
9297	20	5*	2.51	....	8.27	4.40	do
9061	10	4	3.22	....	6.78	3.77	do
9507	10	4	2.15	....	4.07	4.24	do
9524	15	2½	1.52	....	6.65	3.50	do
9293	15	4	1.09	....	7.53	0.70	do
9471	10	3	2.77	....	6.36	3.84	do
9458	15	4	1.08	....	7.63	0.43	do
9464	10	3	7.18	....	18.09	....	Not found adulterated.
9312	20	5*	6.76	....	15.59	....	do.
9504	12	4	7.62	....	16.05	....	do.
9518	12	4	5.88	....	17.53	...	do.
9512	10	4	7.00	....	19.02	....	do.
9274	10	4	6.02	....	19.14	....	do.
9478	15	4	8.34	....	15.82	....	do.
9342	10	1½	6.12	....	18.18	....	do.
9058	15	4	7.15	....	16.86	....	do.
9421	10	3	6.41	....	17.48	....	do.
9351	10	2*	6.56	....	17.45	....	do.
9412	10	1½	7.14	....	17.15	....	do.
9417	8	1½	6.54	....	17.52	....	do.
9489	10	1½	5.99	....	18.44	....	do.

* In glass pepper-shaker.

TABLE XXII—SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Cloves.	
9463	Allyn & Blanchard Co., Hartford, Strictly Pure Cloves.	*Southington.* Finch & Laity.
9455	Austin, Nichols & Co., New York, Blue Ribbon Pure Penang Cloves.	*New Britain.* Boston Branch Grocery, 238 Main St.
9221	Bennett, Simpson & Co., London, Genuine Amboyna Cloves.	*New Haven.* Johnson & Bro., 411 State St.
9498	Bransfield, John, Strictly Pure Cloves.	*Portland.* John Bransfield.
9496	Bushnell Co., The F. C., New Haven, Absolutely Pure Cloves.	*Waterbury.* Thos. Gray, 26 N. Main St.
9183	Clark, Holly & Ketchum, New York, Reliable Cloves.	*New Haven.* Coe & Jenks, 422 State St.
9434	Colburn Co., The A., Philadelphia, Choicest Amboyna Cloves.	G. J. Burt, 894 State St.
9429	Durkee & Co., E. R., New York, XXX Cloves.	do.
9232	Farrington & Co., F. R., New York and Boston, Pure Cloves.	S. S. Adams, 412 State St.
9495	Gray, Thomas, Strictly Pure Cloves.	*Waterbury.* Thos. Gray, 26 N. Main St.
9483	Hills & Co., Gold Seal Cloves.	*Hartford.* Hills & Co., 372 Asylum St.
9062	Leggett & Co., Wm. A., Pure Cloves.	*Greenwich.* L. Timmons.
9505	Lincoln, Seyms & Co., Hartford, Pure Cloves.	*Portland.* C. A. Ahlquist.
9059	Montayne & Co., W. H., New York, Pure Cloves.	*Greenwich.* J. L. Mahoney.
9526	Slade Co., D. & L., Boston, Absolutely Pure Cloves.	*New Haven.* I. B. Chandler, 101 Dixwell ave.
7451	Sovereign Trading Co., Pure Cloves.	*New Britain.* Sovereign Trading Co., 282 Main St.
9469	Stickney & Poor, Boston, Absolutely Pure Cloves.	*Forestville.* J. N. Todd.
9492	Sultana Spice Mills, A. & P., Cloves.	*Waterbury.* Atlantic & Pacific Tea Co., 31 E. Main St.
9472	Union Spice Co., New York, Celebrated Compound Cloves.	*Hartford.* Union Pacific Tea Co., 174 Asylum St.
9460	Upson Bros., Absolutely Pure Cloves.	*Southington.* Upson Bros.
	Allpsice.	
9466	Allyn & Blanchard Co., Hartford, Strictly Pure Allspice.	*Southington.* Finch & Laity.
9209	Augur & Tuttle, New Haven, Crescent Mills Pure Allspice.	*New Haven.* S. S. Adams, 412 State St.
9220	Austin, Nichols & Co., New York, Blue Ribbon Pure Allspice.	Johnson & Bro., 411 State St.

Sealed and Labeled Packages.

Station No.	Price per package, cents.	Ounces in package.	Ash.		Ether extract.		Remarks.
			Total.	Insoluble in HCl. (Sand).	Volatile.	Non-volatile.	
9463	10	3	7.23	....	13.82	7.19	Not found adulterated.
9455	10	4	7.92	....	12.58	5.78	do.
9221	10	4	6.52	....	17.27	6.30	do.
9448	10	4	5.88	....	14.01	6.49	Adulterated with wheat product.
9496	10	4	7.31	....	13.03	6.12	Not found adulterated.
9183	15	4	5.99	....	16.77	6.31	do.
9434	15	3½*	8.80	1.25	9.25	7.90	Contains clove stems.
9429	10	2½	7.44	....	11.32	4.87	Not found adulterated.
9232	5	4	7.82	....	8.91	6.97	Contains clove stems.
9495	10	4	8.32	1.07	9.76	6.08	do.
9483	20	2*	6.54	....	16.03	5.86	Not found adulterated.
9062	10	4	4.76	....	1.43	4.49	Adulterated with allspice.
9505	15	4	9.42	2.06	6 19	6.38	Contains clove stems.
9059	10	4	6.59	....	18.25	5.61	Not found adulterated.
9526	9	4	7.47	...	11.03	5.78	do.
7451	10	4	7.43	....	14.71	6.68	do.
9469	10	4	7.19	....	14.19	6.11	do.
9492	10	2½	6.39	....	11.95	5.21	do.
9472	10	3	7.00	....	7.25	5.21	Contains ground cocoanut shells & starchy matter.
9460	14	4	6.90	....	16.57	5.84	Not found adulterated.
9466	10	3	5.14	....	1.47	5.50	do.
9209	10	4	9.20	1.09	1.49	3.85	Adulterated with ground cocoanut shells.
9220	10	4	5.56	....	2.49	4.15	Not found adulterated.

* In glass pepper-shaker.

TABLE XXII—SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Allspice — Continued.	
9516	Bennett, Simpson & Co., London, Genuine Pimento or Allspice.	*Norwich.* H. I. Palmer, 231 Union St.
9016	Birdsey, C. K., Bridgeport, Allspice.	*Bridgeport.* Centennial Tea Co., 856 Main St.
9499	Bransfield, John, Strictly Pure Allspice.	*Portland.* John Bransfield.
9435	Colburn Co., The A., Philadelphia, Choicest Jamaica Allspice.	*New Haven.* G. J. Burt, 894 State St.
9428	Durkee & Co., E. R., Allspice.	do.
9231	Farrington & Co., F. R., New York and Boston, Pure Allspice.	S. S. Adams, 412 State St.
9479	Hills & Co., Gold Seal Allspice.	*Hartford.* Hills & Co., 372 Asylum St.
9491	Howard & Co., New York, Pure Jamaica Allspice.	*Waterbury.* The Hewitt Grocery Co., 20 N. Main St.
9502	Kibbe & Co., E. S., Hartford, Pure Allspice.	*Portland.* C. A. Ahlquist.
9515	Pinckney & Co., H. F. A., London, Allspice.	*Norwich.* W. A. Church, 20 Market St.
9446	Slade Co., D. & L., Boston, Absolutely Pure Allspice.	*Wallingford.* Laden Bros.
9448	Sovereign Trading Co., Pure Allspice.	*New Britain.* Sovereign Trading Co., 282 Main St.
9208	Square Deal Pure Spices, Allspice.	*New Haven.* S. S. Adams, 412 State St.
9426	Stickney & Poor's Pure Allspice.	D. M. Welch & Son, 8 Grand Ave.
9424	Sultana Spice Mills, A. & P., Allspice.	Atlantic & Pacific Tea Co., 386 State St.
9333	Tiger Mills, New York, Pure Allspice.	*Putnam.* A. C. Stetson.
9473	Union Spice Co., New York, Celebrated Allspice.	*Hartford.* Union Pacific Tea Co., 174 Asylum St.
9462	Upson Bros., Absolutely Pure Allspice.	*Southington.* Upson Bros.

SEALED AND LABELED PACKAGES—*Continued.*

Station No.	Price per package, cents.	Ounces in package.	Ash.		Ether extract.		Remarks.
			Total.	Insoluble in HCl. (Sand).	Volatile.	Non-volatile.	
9516	15	4	4.54	....	2.16	6.22	Not found adulterated.
9016	10	4	4.11	....	2.75	3.02	Adulterated with ground cocoanut shells.
9499	10	4	4.74	...	2.55	5.00	Not found adulterated.
9435	15*	3½	6.31	.40	2.93	5.66	do.
9428	10	2½	7.51	.95	1.34	3.79	do.
9231	5	4	5.96	...	3.50	3.48	do.
9479	12	4	4.75	...	3.35	3.91	do.
9491	15	4	4.59	....	1.40	6.27	do.
9502	12	4	5.18	....	1.77	5.77	do.
9515	15	4	5.71	....	1.67	4.92	do.
9446	10	4	4.34	....	1.35	4.20	do.
9448	10	4	4.98	....	2.84	3.22	do.
9208	10	4½	9.34	1.52	2.17	3.57	Adulterated with clove stems.
9426	10	2½	4.96	....	3.39	3.68	Not found adulterated.
9424	10	2½	5.05	...	2.22	4.07	do.
9333	18	8	4.52	....	2.49	3.78	do.
9473	10	3	9.62	2.95	3.94	3.17	Too much sand.
9462	10	4	5.74	....	2.06	3.36	Not found adulterated.

* In glass pepper-shaker.

TABLE XXII.—SPICES BOUGHT IN

Station No.	Brand.	Dealer.
	Cinnamon.	
9465	Allyn & Blanchard Co., Hartford, Strictly Pure Cinnamon.	*Southington.* Finch & Laity.
9419	Augur, John P., New Haven, Crescent Mills Pure Cinnamon.	*New Haven.* Philip Hugo, 11 Edwards St.
9050	Austin, Nichols & Co., New York, Blue Ribbon Pure Cinnamon.	*Greenwich.* Knapp & Studwell.
9085	Beard & Co., Samuel S., New York, Pure Cinnamon.	*Stamford.* H. Sawyer Daskam.
9222	Bennett, Simpson & Co., London, Genuine Penang Cinnamon.	*New Haven.* Johnson & Bro., 411 State St.
9503	Bryan, Miner & Read, New Haven, Pure Cassia.	*Portland.* C. A. Ahlquist.
9519	Bugbee & Brownell, Providence, Pure Cinnamon.	*Norwich.* A. T. Otis, 261 Main St.
9497	Bushnell Co., The F. C., New Haven, Absolutely Pure Cinnamon.	*Waterbury.* Thos. Gray, 26 N. Main St.
9416	Clark, Chapin & Bushnell, New York, Pure Cinnamon.	*Ansonia.* W. H. Bronson, 234 Main St.
9184	Clark, Chapin & Bushnell, New York, Diamond Absolutely Pure Cinnamon.	*New Haven.* Coe & Jenks, 422 State St.
9432	Colburn Co., The A., Philadelphia, Choicest Java Cinnamon.	G. J. Burt, 894 State St.
9513	Daniels, Cornell & Co., New London, Strictly Pure Cinnamon.	*Groton.* H. E. Marquidt.
9430	Durkee & Co., E. R., New York, XXX Cinnamon.	*New Haven.* G. J. Burt, 894 State St.
9229	Farrington & Co., F. R., New York and Boston, Pure Cinnamon.	S. S. Adams, 412 State St.
9511	Leggett & Co., Francis H., New York, Best Cinnamon.	*Madison.* F. C. Dowd.
9095	Lincoln, Seyms & Co., Hartford, Pure Cinnamon.	*Hartford.* H. E. Hills & Co., 547 Main St.
9057	Montanye & Co., W. H., New York, Pure Cinnamon.	*Greenwich.* J. L. Mahoney.
9525	Slade Co., D. & L., Boston, Absolutely Pure Cinnamon.	*New Haven.* I. B. Chandler, 101 Dixwell Ave.
9449	Sovereign Trading Co., Pure Saigon Cinnamon.	*New Britain.* Sovereign Trading Co., 282 Main St.
9500	Stickney & Poor, Boston, Absolutely Pure Cassia.	*Portland.* John Bransfield.
9413	Stickney & Poor, Pure Cinnamon.	*Ansonia.* D. M. Welch & Son, Main St.
9422	Sultana Spice Mills, New York, A. & P. Cinnamon.	*New Haven.* Atlantic & Pacific Tea Co., 386 State St.
9474	Union Spice Co., Pure Cinnamon.	*Hartford.* Union Pacific Tea Co., 174 Asylum St.

SEALED AND LABELED PACKAGES — *Continued.*

Station No.	Price per package, cents.	Ounces in package.	Ash.		Remarks.
			Total.	Insoluble in HCl. (Sand).	
9465	10	3	4.79	....	Not found adulterated.
9419	10	4	5.11	....	do.
9050	10	4	4.86	....	do.
9085	13	4	5.04	....	do.
9222	15	4	5.26	....	do.
9503	15	4	2.70	....	do.
9519	15	4	6.84	....	do.
9497	10	4	3.88	....	do.
9416	10	3	8.02	3.15	do.
9184	15	4	4.70	....	do.
9432	15	3½*	4.93	....	do.
9513	10	4	3.18	....	do.
9430	10	2½	5.15	....	do.
9229	5	4	4.37	....	do.
9511	12	4	4.76	....	Contains ginger.
9095	12	4	5.89	....	Not found adulterated.
9057	12	4	8.40	4.49	do.
9525	9	4	3.71	....	do.
9449	10	4	5.02	....	do.
9500	15	4	4.24	....	do.
9413	10	2½	5.05	....	do.
9422	10	2½	7.15	2.24	do.
9474	10	3	7.27	3.07	do.

* In glass pepper-shaker.

TABLE XXII.—SPICES BOUGHT IN

Station No.	Brand.	Dealer.
9329	Union Spice Co., Pure Cinnamon.	*Putnam.* Union Pacific Tea Co.
9457	Upson Bros ,Absolutely Pure Cinnamon.	*Southington,* Upson Bros.
9039	No manufacturer given, Pure Cinnamon.	*Bridgeport.* The Village Market, Main St.
	Nutmeg.	
7324	Bennett, Simpson & Co., London, Penang Nutmeg.	*Hartford.* Woodward & Co., 174 Asylum St.
9298	Farrington & Co., F. R., New York, Pure Nutmeg.	*New London.* J. E. St. John, 265 Bank St.
9484	Hills & Co., Gold Seal Nutmeg.	*Hartford.* Hills & Co., 372 Asylum St.
9060	Montanye & Co., W. H., New York, Pure Nutmeg.	*Greenwich.* J. L. Mahoney,
7353	Slade Co., D. & L., Boston, Epicurean Nutmeg.	*Willimantic.* Frank Larrebee, 16 Church St.
7385	No manufacturer given, Ground Nutmegs.	H. C. Hall, 17 Union St.

SEALED AND LABELED PACKAGES.— *Concluded.*

Station No.	Price per package, cents.	Ounces in package.	Ash.		Remarks.
			Total.	Insoluble in H Cl. (Sand).	
9329	10	3	5.87	....	Not found adulterated.
9457	12	4	4.24	....	Contains ginger.
9039	6	2½	5.44	....	Not found adulterated.
7324	25	4*	7.34	...	do.
9298	10	2	8.46	....	do.
9484	25	2*	6.59	....	do.
9060	28	4	3.47	....	do.
7353	15	2	6.10	....	do.
7385	15	2	6.37	...	do.

* In glass pepper-shaker.

THE CHEMICAL COMPOSITION OF AUTHENTIC SAMPLES OF SPICES AND SPICE ADULTERANTS.

By A. L. Winton, A. W. Ogden, and W. L. Mitchell.

The microscope is, without doubt, the most valuable means of detecting adulteration in ground spices, as it furnishes direct ocular evidence and usually discloses the nature of the foreign material present. But since mineral matters and some other spice adulterants do not have very distinctive microscopic characters, it is necessary to resort to chemical analysis for their detection. Furthermore, the results of quantitative chemical determinations often confirm the conclusions reached by microscopic examination and, in cases of adulteration, furnish data for estimating roughly the percentage of foreign matter present.

A knowledge of the composition of the various grades of whole spices on the market is essential for the proper interpretation of analyses of samples of ground spices of unknown origin.

In 1887, Richardson* published a most valuable report on spices and spice adulteration, in which are given full descriptions of the nature and preparation of the various spices, the quantities imported into the United States, the adulterations practiced, and the methods for detecting adulteration. The report also contains analyses of 42 samples of whole spices, ground in the laboratory of the Department of Agriculture, and of numerous samples of ground spices collected in the open market.

Richardson's analyses of whole spices from the American market are, practically, all that have been published up to date, and have been very generally consulted in interpreting results on suspected samples; but grades of some of the spices are now on the market which were not obtainable at the time that Richardson collected his samples, and, furthermore, since his report appeared new methods of analysis have been devised.

* U. S. Dept. of Agr., Div. of Chem., Bull. 13, Part II.

In our examinations of ground spices the need of further analyses of whole spices has been apparent, and during the present year opportunity was presented for this work.

In response to our request, four of the leading spice importers of the country, namely — E. R. Durkee & Co., Francis H. Leggett & Co., and Austin, Nichols & Co., all of New York, and D. & L. Slade Co. of Boston, courteously granted us permission to sample all the goods in their stock, and also offered us their assistance in other ways.

During the months of August and September, 101 samples of pure whole spices were carefully drawn by a representative of the station from original, unbroken, import packages, in warehouses at New York and Boston. Whenever possible, several packages were opened in drawing each sample.

The firms mentioned, through their knowledge of the trade, also secured for us samples of damaged spices and some of the by-products from spices, which are often mixed with ground spices and are generally rated by official analysts as adulterants.

Various samples of ground nut shells, fruit stones, sawdust, and some other materials used as adulterants, were prepared in the station laboratory.

The samples collected may be classified as follows:

Black pepper,	14 samples.
White pepper,	10 "
Cayenne pepper,	8 "
Ginger,	18 "
Ceylon cinnamon,	6 "
Cassia,	21 "
Cassia buds,	2 "
Cloves,	8 "
Allspice,	3 "
Nutmegs,	5 "
Mace,	6 "
Spice by-products and adulterants,	24 "
Total,	125 samples.

The cereal products used as adulterants have been frequently analyzed in various laboratories, to determine their feeding value, and these analyses we deemed sufficient for our purpose, without collecting and analyzing new samples.

Preparation of Samples.

From one to two pounds of each sample are ground in a steel mill, so as to pass a sieve with round holes 1/25 inch in diameter. This grinding is usually sufficient, but for the determination of starch in white pepper by the diastase method, it is necessary to reduce to a finer powder in a mortar, as, otherwise, the starch is not completely extracted from the hard grains of endosperm.

Methods of Analysis.

Moisture. Two grams are dried at 110° C. to constant weight. From the loss in weight thus sustained is subtracted the amount of volatile ether extract, the difference being moisture.

Total Ash. Two grams are incinerated in a muffle furnace, at a heat below redness.

Ash Soluble in Water. The ash prepared as above is boiled with 50 cc. of water and the insoluble portion collected on a Gooch crucible, washed with hot water, dried, ignited, and weighed. The percentage of insoluble ash thus determined, subtracted from the percentage of total ash, leaves the percentage of water-soluble ash.

Ash Insoluble in Hydrochloric Acid, or "Sand." Two grams of the incinerated material are boiled with 25 cc. of 10 per cent. hydrochloric acid and the insoluble matter collected in a Gooch crucible, washed with hot water, ignited, and weighed.

Lime. A weighed portion is incinerated and the ash dissolved in boiling hydrochloric acid. If soluble silica is present, it is separated in the usual manner. The acid solution, nearly neutralized with ammonium hydrate, is heated to about, but not above 50° C. 3 cc. of acetic acid and ammonium acetate in sufficient quantity are added and the solution is vigorously stirred. When the precipitate of iron phosphate, or of iron phosphate and basic acetate, has settled, it is filtered and washed with water containing a little ammonium acetate. To the filtrate, without neutralizing the acetic acid, ammonium oxalate is added and the precipitate of calcium oxalate collected on a filter, converted into oxide by ignition and weighed.

Volatile and Non-Volatile Ether Extract. The method is that described by Richardson.* Two grams of the ground material are extracted for 20 hours in a Johnson extractor † with absolute ether. The ethereal solution is transferred to a tared capsule and the ether allowed to evaporate at the room temperature. After standing 18 hours over sulphuric acid, the total ether extract is weighed. The extract is then heated, first at 100° for 6 hours and then at 110°, until the weight becomes constant, the loss being the volatile oil; the residue, the non-volatile ether extract.

Absolutely complete extraction of spices, even after treatment with ether for several days, is hardly possible, but the results which follow, Table XXIII, show that, for all practical purposes, extraction for 20 hours is sufficient.

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* U. S. Dept. Agr., Div. Chem., Bull. 13, Part II, 165.

† Amer. Jour. Sci., March, 1877, 196.

TABLE XXIII. ETHER-EXTRACT FROM PURE SPICES.

	Average per cent. of Ether-extract removed.		
	During 1st 10 hours extraction.	Between 10th and 20th hours of extraction.	Between 20th and 30th hours of extraction.
Allspice. Three samples,	9.28	0.28	0.18
Black Pepper. Eight samples,	9.40	0.14	0.08
Cassia. Three Samples,	5.87	0.27	0.10
Cassia Buds. Two samples,	9.37	0.33	0.14
Cayenne. Eight samples,	20.59	0.43	0.20
Cloves. Eight samples,	25.18	0.25	0.16
Clove Stems. Two samples,	8.56	0.16	0.10
Cinnamon. Three samples,	2.63	0.26	0.19
Ginger. One sample,	4.32	0.18	0.11
Mace. Five samples,	31.53	0.25	0.21
Nutmeg. Two samples,	39.08	0.19	0.11

Alcohol Extract. — Two grams of material are placed in a 100 cc. flask, which is filled to the mark with ninety-five per cent. alcohol (sp. gr. 0.817). The flask is stoppered and allowed to stand twenty-four hours, being shaken every thirty minutes during the first eight hours. The extract is then filtered through a dry filter, and 50 cc. are evaporated to dryness in a flat-bottomed aluminium dish on a water bath, and heated to constant weight at 110° C. The result is practically the same when the time of extraction is forty-eight instead of twenty-four hours.

It is not claimed that this method extracts all matter soluble in alcohol; in fact, the residues separated from the solutions by filtration, when treated for twenty-four hours longer with a fresh portion of ninety-six per cent. alcohol, yield small additional amounts of extract; but the method gives nearly the full amount of extract and the results are concordant; whereas, extraction in a Soxhlet apparatus, if continued until no more extract is removed, is almost an interminable operation, and, as it is difficult to keep the strength and temperature of the extracting alcohol constant, does not give satisfactory results.

Copper-Reducing Matters by Direct Inversion. — Four grams are extracted with ether and washed on a filter that will completely retain the smallest starch granules,* with 150 cc. of ten per cent. alcohol.† Weak alcohol is employed instead of water, because, as pointed out by Lindsey, it is not so liable to carry starch granules through the paper. The residue is transferred to a 500 cc. flask, with 200 cc. of water; 20 cc. of hydrochloric acid (sp. gr. 1.125) are added and

* Schleicher and Schüll's No. 589 blue ribbon washed filters were found satisfactory.

† As Batavia cassia forms with water or dilute alcohol a glutinous mass which clogs the filter, it is not possible to wash samples of this cassia with either liquid previous to inversion, and, for the sake of uniformity, this treatment is also omitted in the determinations made on the other varieties of cassia, as well as on cassia buds and cinnamon.

the whole heated on a boiling water bath for three hours (Sachsse's Method*). After cooling, the solution is nearly, but not quite, neutralized with sodium hydrate solution, made up to 500 cc. and filtered through a dry paper. Reducing matters are determined by Allihn's method,† as follows:

Thirty cc. of a solution containing 173 grams of Rochelle salt and 125 grams of caustic potash in 500 cc. of water, and 30 cc. of a solution of 34.69 grams of pure crystallized copper sulphate in 500 cc. of water are mixed in a beaker of 200 cc. capacity and the mixture heated to boiling. To the boiling liquid, without delay, are added 25 cc. of the solution to be examined, and the heating further continued until boiling begins again. After the reduced copper suboxide has settled it is collected on a Gooch crucible, dried at a moderate heat, and finally, heated *carefully* for three to five minutes at dull redness, care being taken to avoid a bright red heat and to allow access of sufficient air to complete the oxidation to copper oxide. After weighing, the heating should, in all cases, be repeated, to make certain that the oxidation is complete.

From the weight of copper oxide is calculated the weight of metallic copper, the factor .7986 being used, and the corresponding amount of dextrose is found in Allihn's tables. From the weight of dextrose, that of starch is calculated by using the factor 0.9.

In the preparation of asbestos pulp for use in the Gooch crucible, woolly asbestos is cut into small pieces, boiled with hydrochloric acid and washed free from acid and fine particles on a sieve with $\frac{1}{25}$ inch meshes. This asbestos, when packed in the crucibles with the aid of a blunt glass rod, retains completely the finely divided copper suboxide, which is not true of the long fiber variety usually employed in filtering coarser precipitates.

To test the accuracy of the oxidation method, six precipitates which had been weighed as oxide were reduced in hydrogen and weighed as metallic copper.‡ The following are the results:

Station No.	Material.	CuO.	Cu.	
			Calculated from CuO.	Obtained by reduction.
		Gram.	Gram.	Gram.
9688	Decorticated white pepper,	0.3450	0.2755	0.2755
9643	Siam white pepper,	.3170	.2532	.2531
9644	Singapore white pepper,	.3039	.2428	.2433
9682	Pin-head pepper,	.1600	.1278	.1281
9684	Pepper shells (hulls and dust),	.1185	.0946	.0948
9690	Pepper shells (hulls),	.0600	.0479	.0480

* Chem. Centralbl., 1877, 732. This Station Rep., 1887, 132.

† Jour. Prakt. Chem., *22*, 52. This Station Rep., 1887, 129.

‡ Compare Bartlett, Maine Ag. Ex. Sta. Rep., 1888, 207.

Starch by Diastase Method. — The method employed, except in minor details, is that described by Maercker.*

Four grams of the finely ground material are extracted with ether and ten per cent. alcohol, as described in the preceding section. The wet residue is rubbed up thoroughly in a mortar, washed into a beaker with 100 cc. of water, and made into a paste by boiling for thirty minutes. To prevent sticking to the bottom of the beaker and burning, the heating is performed on an asbestos plate and the liquid is constantly stirred with a rod. The water lost by evaporation is replaced and the beaker immersed in a water bath kept at from 55° to 60° C. When the liquid has cooled to the temperature of the bath, 10 cc. of freshly prepared malt extract† are added and the mixture digested for one hour, with occasional stirring. It is then boiled a second time for fifteen minutes, cooled, and digested, as before, with another portion of 10 cc. of malt extract. After heating to boiling the third time, the liquid is made up to 250 cc. in a graduated flask, filtered through dry paper and 200 cc. of the filtrate removed to a 500 cc. flask. The inversion with acid and determination of the reducing power is conducted as has been described, making a correction for the copper reduced by the added malt extract, which is determined by blank analyses. The residue after the malt digestion, when examined microscopically, should be entirely free from starch.

Cayenne pepper, mustard, and certain other materials, which are practically free from starch — as is shown by the microscope — when treated by the method just described, yield very little or no copper-reducing matter. This treatment is, therefore, without effect on the cellulose, pentosans, or other matters in the spices named, although they yield copper reducing material on treatment with acid.

On the other hand, in decorticated white pepper and Jamaica ginger, which contain little besides starch that is affected by acid, practically the same results are obtained by the diastase method as by direct inversion with acids.

This determination of starch is very valuable as a means of detecting starchy adulterants in spices normally free from starch, and non-starchy adulterants in spices which contain starch.

Crude Fiber is determined by the method of the Association of Official Agricultural Chemists,‡ with slight modifications:

The residue from the determination of ether extract is placed in a 500 cc. Erlenmeyer flask and 200 cc. of boiling 1.25 per cent. sulphuric acid are added. The flask is loosely covered and the liquid heated at once to gentle boiling. The boiling is continued thirty minutes. The solution is filtered on a paper, washed with hot water, and rinsed back into the same flask, with 200 cc. of boiling 1.25 per cent. solution of sodium hydrate nearly free from carbonate. After boiling as before for thirty minutes, the fiber is collected on a weighed paper, thoroughly

* Handbuch der Spiritusfabrikation, 7th Ed., 1898, 109. See also Wiley, Principles and Practice of Agricultural Analysis, 1897, Vol. III, 198.

† Prepared by digesting for two or three hours 100 grams of powdered malt with 1000 cc. of water and filtering.

‡ U. S. Dept. of Agr., Div. Chem., Bull. 46, 63.

washed with hot water, and finally washed with a little alcohol and ether, dried to constant weight at 100° C. and weighed.

The amount of ash in the fiber is determined by incineration, and deducted from the total weight.

Nitrogen by the Kjeldahl Method. — Nitrogen is determined in all the spices, except black and white pepper, by the usual Kjeldahl method.*

Nitrogen by the Gunning-Arnold method. — As nitrogen cannot be accurately determined in black and white pepper by the Kjeldahl method, owing to the presence of piperine, the Gunning-Arnold method is used to determine nitrogen, both in pepper and in the ether extract from the pepper.†

One gram of the material is mixed in a 600 cc. Jena flask with one gram of cupric sulphate, one gram of red oxide of mercury, fifteen to eighteen grams of potassium sulphate, and 25 cc. of sulphuric acid. After heating gently without shaking until frothing ceases, the mixture is boiled from three to four hours. When nearly cool, about 300 cc. of water, 50 cc. of potassium sulphide solution and sodium hydrate solution to alkaline reaction are added and the ammonia is distilled and titrated as usual.

The following percentages of nitrogen were obtained on chemically pure piperine: —

Gunning-Arnold method,	4.77, 4.77, 4.79, and 4.83 per cent.
Absolute method,	4.92 per cent.
Theory,	4.91 " "

By the Kjeldahl and by the Gunning method, percentages ranging from 2.06 to 3.8 were obtained.

The determination by the absolute method was made by Mr. Campbell.

Nitrogen in the Ether Extract. — Ten grams of material are extracted for twenty hours in a Johnson extractor, the extract being collected in a weighed Jena flask of about 250 cc. capacity. The ether is evaporated and the flask with contents is heated, first at 100°, and, finally, to constant weight at 110°. Nitrogen is determined in the weighed extract by the Gunning-Arnold method, as already described.

Cold Water Extract. — Four grams of the material are placed in a 200 cc. flask and water added to the mark. The flask is tightly stoppered and shaken at half-hour intervals during eight hours, after which it is allowed to stand sixteen hours without shaking. A 50 cc. portion of the filtered solution is transferred to a tared aluminium dish and evaporated to dryness on a water bath. The residue is dried to constant weight at 100° C. in a drying oven, two hours' heating being usually sufficient.

This method is much more easily carried out and gives more concordant and somewhat higher results than extraction on a filter, with the same volume of water added in successive portions. Complete extraction on a filter was found impossible.

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* U. S. Dept. of Agr., Div. Chem., Bull. 46, 16.

† Ztschr. Anal. Chem., 31, 525.

*Tannin Equivalent.** — Two grams of material in a paper cylinder are extracted twenty hours with Squibbs' absolute ether. The residue is boiled for two hours with 300 cc. water, cooled, made up to 500 cc , and filtered.

Twenty-five cc. of the filtrate are measured into a flask of about 1,200 cc. capacity; 20 cc. of indigo solution and 750 cc. distilled water are added and standard potassium permanganate run in at the rate of one or two drops a second, with constant shaking, until a bright golden yellow is obtained.

The reducing power of 20 cc. of indigo solution is determined in exactly the same manner.

The number of cc. of permanganate required to oxidize the tannin and indigo together, less the amount necessary to oxidize 20 cc. indigo solution alone, gives the number of cc. equivalent to the tannin present.

Standard potassium permanganate is prepared by dissolving 1.333 grams of the pure salt in 1,000 cc. of water. It is standardized by the titration of 10 cc. of decinormal oxalic acid (6.3 grams of pure crystallized acid in 1,000 cc.) which have previously been diluted to 500 cc., heated to 60° C., and mixed with 20 cc. of dilute sulphuric acid (1.3). The permanganate is added slowly, with constant stirring, until a pink color appears.

Indigo solution must be made from sodium sulphindigotate of good quality, otherwise the titration will not be sharp.† Six grams of the salt are dissolved in 500 cc. of water, with the aid of heat, cooled, mixed with 50 cc. of concentrated sulphuric acid, made up to one liter and filtered.

Ten cc. of decinormal oxalic acid solution are equivalent to 0.06235 grams of quercitannic acid, or 0.008 grams of "oxygen absorbed."

The value of the method for the examination of cloves is apparent when the "tannin equivalent" of pure cloves is compared with that of the common adulterants of cloves.

Determinations of tannin equivalent were also made on a few samples of other spices, but the results, as will be seen from the following table, are too low to be of much diagnostic value:

Station No.	Material.	Oxygen Equivalent.	Calculated as Quercitannic Acid.
9631	Cassia,	0.50	3.90
9640	Cinnamon,	0.98	7.80
9618	Ginger,	0.03	.26
9677	Mace,	0.16	1.30
9617	Nutmegs,	0.33	2.60
9610	Red Pepper,	0.13	1.04
9654	Red Pepper,	0.33	2.60
9714	Black Pepper,	0.33	2.60
9690	Pepper Shells,	0.43	3.38
9692	Long Pepper,	0.13	1.04
9609	Cassia Buds,	1.13	8.84

* See U. S. Dept. Ag., Div. Chem., Bull. 13, Part II, 167. Also Allen, Commercial Organic Analysis, 1889, Vol. III, Part I, p. 109 *et seq.*

† The indigocarmin of G. Grueber & Co., Leipsic, is adapted for the purpose.

Notes on the Samples Examined.

Black Pepper, Pepper By-products and Adulterants.

Singapore black pepper, it is stated, is dried over fires in the gambier plantations, and has, in consequence, a strong smoky odor. The berries are hard and perfect. The other varieties of black pepper are usually sun dried.

Singapore, Tellicherry, and Lampong are at present valued in the order stated, although there is but little difference in price.

Acheen, Sumatra, or Penang is of poorer quality and contains more or less empty berries, many of which are broken during transportation. Formerly there were two grades, the East Coast and the West Coast, the latter being considered the better, but the pepper from Sumatra is now graded by the London Produce Brokers' Association as follows:

Class A. One imperial gallon should weigh at least four pounds thirteen ounces (481 grams per liter).

Class B. One imperial gallon should weigh at least four pounds five ounces (431 grams per liter).

Class C. One imperial gallon should weigh at least three pounds thirteen ounces (381 grams per liter).

Class D. One imperial gallon should weigh at least three pounds nine ounces (356 grams per liter).

Class A is the same as West Coast Sumatra, and some lots run over five pounds to the gallon. None of the grades should contain over three per cent. of "dust," which term includes stalks, stone, clay, and other foreign matter.

Messrs. E. R. Durkee & Co. supplied the results of actual tests of the samples procured from them, which are as follows:

No. 9646.* Four pounds fourteen ounces per gallon (488 grams per liter), three and one-half to four per cent. dust.

No. 9647. Four pounds per gallon (400 grams per liter), four per cent. dust.

No. 9648. Three pounds ten ounces per gallon (362 grams per liter).

No. 9682, pin-head pepper, is a mixture of small pepper corns with a large amount of shells.

* The numbers refer to samples whose analyses are given on pp. 198 and 199.

Pepper shells is the trade name for a mixture of hulls and dust obtained as a by-product in the preparation of white pepper. Nos. 9689 and 9684 contain not only shells, but a large amount of powdered material, and represent fairly the goods frequently sold as pepper shells. No. 9690 consists almost entirely of hulls, such as are always present in small amount in the lower grades of Acheen.

Long pepper, the fruit of *Piper longum*, is occasionally used as an adulterant for black pepper. One sample, No. 9692, was analyzed.

White Pepper.

Decorticated white pepper (Nos. 9641 and 9688) consists of hard, smooth kernels which, for the most part, are entirely free from the seed coats. Singapore and Siam white pepper are at present of about the same quality and cost. The samples of Penang drawn by us are all coated with a dirty brown material consisting chiefly of carbonate of lime.

Cayenne Pepper.

The samples of Japan cayenne or chillies are entirely free from stems and calyxes. The pods are about 2 cm. long and 0.5 cm. broad at the broadest part, and of a most brilliant red color.

Zanzibar cayenne is one of the best varieties used for grinding, although at present the quality is rather poor. In the samples examined the slender pods vary in length from 0.5 to 2.0 cm., and are of a dull red or brown color. The stems and calyxes are present, but usually detached from the pods.

Capsicums, or "Bombay peppers," are a low grade of chillies which are now said to come from the vicinity of the river Niger, in Africa. In the samples examined, which are free from stems and calyxes, the brown or yellow brown pods are 2 to 3 cm. long and nearly 1 cm. broad.

Ginger and Ginger By-products.

Two grades of Jamaica ginger come into our market, the "scraped" or "unbleached" and the "bleached" or "limed." The bleached root appears to be the same product as the unbleached, except for a coating of chalk which serves as a protection against the destructive drugstore beetle and other insects.

Cochin ginger (also called Borneo ginger) is of several grades. No. 9670 is stated to be rough washed, but not bleached. No. 9678 has been "cut" (trimmed), scraped, and limed. The samples graded A, B, C, are of light color and fine appearance, but neither scraped nor limed. The roots of D Cochin are not as thick as the A, B, C, and are darker in color.

Both samples of Japan ginger, Nos. 9656 and 9725, consist of short, thick pieces of root coated with lime, and resemble the cut and scraped Cochin, No. 9678.

African ginger (also known as Sierra Leone) and Calcutta ginger (also known as East India) are both dark-colored, unattractive products. Of these the African is much the better in quality, although at present it is sold for about the same price as the Calcutta.

No. 9681, rejections from D Cochin, and No. 9693, ginger cuttings or clippings, should be considered as a ginger by-product and not as ginger.

One of the samples of exhausted ginger, No. 9727, is stated to have come from an English ginger-ale works; the other, No. 9368, is from an extract factory.

Cinnamon, Cassia, and Cassia Buds.

Ceylon, or true cinnamon, is graded according to the diameter of the composite quills, No. 1 extra being the smallest. It is now seldom used in the United States as a spice, the so-called ground cinnamon being prepared from cassia bark or buds.

Saigon cassia, the best grade of cassia, varies in size from pieces scarcely thicker than a sheet of writing paper to coarse bark, one-eighth inch or more in thickness. It is put up in bundles weighing three to four pounds, each consisting entirely of thick,

thin, or medium thickness bark. Several bundles of different sized bark are packed in the same mat. The thin bark is considered the strongest. Two samples of broken Saigon (Nos. 9636 and 9707) are of good quality, but No. 9698, graded as No. 2, is inferior, containing pieces of bark one-quarter inch in thickness.

Batavia cassia comes in two grades, No. 1 and No. 2, the latter, which is also known as broken Batavia or short stick, is not so well scraped as No. 1 and comes in shorter pieces.

Whole China cassia is packed in mats containing two bundles of about two pounds each. The outer pieces in the bundles are a foot or more long, but the interior contains chips, and often, more or less dirt. The frosts of some years ago killed many of the trees in China, and it has been stated that the bark of the dead trees is now put on the market. The sample of broken China cassia, No. 9737, owing to the dirt it contains, is entirely unfit for consumption. In order to accurately arrive at the composition, a bale of sixty pounds was separated into two parts, by sifting through a one-quarter inch mesh, and each part was separately analyzed.

One hundred of the cassia buds from No. 9609 weigh 6.15 grams, and from No. 9665 weigh 6.03 grams.

Cloves and Clove Stems.

No particulars other than are given in the table were learned.

Allspice.

No two of the samples are alike in appearance, and it is not remarkable that the analyses show a wide variation in composition.

Nutmegs.

True nutmegs are the dried seed kernels of *Myristica fragrans*, Houttuyn. Of the better grades, the brown (*i. e.* unlimed) Penang nutmegs are sold to some extent in the United States, but not so commonly as the limed kernels from Banda and Singapore.

The Singapore nutmegs examined (Nos. 9617, 9664, and 9719) are from 2.2 to 2.8 cm. long, and from 1.7 to 2.1 cm. broad.

The Padang nutmegs (No. 9673) are deeply wrinkled on the surface and extremely variable in form and size, ranging in length from 2 to 2.9 cm., and in breadth from 1.5 to 2.1 cm.

The so-called Macassar nutmegs, which are probably the same as those known in Europe as Papua or long nutmegs (the seed kernels of *M. argentea*, Warb.), are inferior to the true nutmegs. In the sample examined the kernels are from 2.6 to 3.6 cm. long, and from 1.6 to 2.1 cm. broad.

The sample of grinding nutmegs, No. 9696, consists of abortive and insect-eaten kernels, with some nutmeg shells, and is entirely unfit for consumption. The starchy portion of the insect-eaten kernels has been entirely devoured, leaving only the resinous veins in the interior. On the surface are holes through which the insect emerged. Many of these nutmegs can be readily crushed between the fingers.

Mace.

The true or sweet mace (the seed mantle or arillus of *Myristica fragrans*, Houttuyn) which comes into this country is designated Banda, Penang, Singapore, and Batavia, or Padang, according to its origin. As the product from any of these localities may be good or bad, it is customary to value mace more by its appearance than by its place of growth.

The sample of Banda mace, No. 9619, and the two samples of No. 1 Penang mace, Nos. 9662 and 9717, are of good quality and alike in appearance. No. 9677 (No. 2 Penang) is somewhat inferior.

The "grinding mace," No. 9694, is evidently damaged.

Macassar or wild mace, the arillus of *Myristica argentea*, Warb., has a strong wintergreen flavor, but is considered inferior to the varieties of true or sweet mace. The sample analyzed, No. 9675, contains a few shells of the nutmeg, in addition to the arillus.

Bombay mace, from *Myristica Malabarica*, Lamark, must be regarded as an adulterant. The sample examined, No. 9676, has no value whatever as a spice.

WHOLESALE QUOTATIONS OF SPICES, SEPT. 12, 1898.

Cassia, Batavia, No. 1,	Per lb.,	17 @ 18
broken,		13 @ 15
Canton, matted rolls,		8¾ @ 9
broken,		6¼ @ 7½
Saigon, rolls,		48 @ 52
broken,		37 @ 38
Buds,		23½ @ 25
Cloves, Amboyna,		10¾ @ 12
Zanzibar,		8¾ @ 9
stems,		— @ 4½
Ginger, African,		4¾ @ 5
Calcutta,		4⅝ @ 5
Cochin, A, B, C,		6¼ @ 6¾
D,		5 @ 5½
Jamaica, bleached,		19 @ 20
unbleached,		17 @ 20
Mace, Banda,		45 @ 48
Batavia,		33½ @ 38
Penang,		43 @ 45
Nutmegs, 110's,		32 @ 32½
Pepper, black, Acheen,		9⅛ @ 9½
Singapore,		9⅝ @ 9¾
West Coast Sumatra,		9½ @ —
white, Penang,		16¼ @ 16¾
Singapore,		18 @ 18¼
red, capsicums,		7¼ @ 8½
Zanzibar,		11 @ 12
Pimento, Jamaica, prime,		9¾ @ 10½

TABLE XXIV. BLACK PEPPER, WHITE PEPPER,

Station No.		Importer.	Weight of 1 litre in grams.
	Black Pepper:		
9712	Singapore,	Austin, Nichols & Co., New York,	452.
9649	"	E. R. Durkee & Co., New York,	474.
9614	"	D. & L. Slade Co., Boston,	493.
9615	"	" "	472.
9616	"	" "	489.
	" average,		**476.**
9713	Tellicherry,	Austin, Nichols & Co., New York,	535.
9650	"	E. R. Durkee & Co., New York,	561.
	" average,		**548.**
9645	Lampong,	E. R. Durkee & Co., New York,	493.
9685	"	Francis H. Leggett & Co., New York,	530.
	" average,		**511.**
9646	Acheen, Class A,	E. R. Durkee & Co , New York,	432.
9647	Acheen, Class B,	" "	407.
9648	Acheen, Class C,		345.
9683	" "	Francis H. Leggett & Co., New York,	316.
9714	Acheen, Class not given,	Austin, Nichols & Co., New York,	301.
	Acheen, average,		**360.**
	All analyses. Maximum,		561.
	All analyses. Minimum,		301.
	All analyses. Average,		
	Pepper By-products and Adulterants:		
9682	Pinhead. Siftings from Acheen, Class C,		
9690	Pepper Shells (hulls only),		
9684	Pepper Shells (hulls and dust),		
9689	" "		
9692	Long Pepper,		
9732	Buckwheat hulls,		
	White Pepper:		
9641	Decorticated,	E. R. Durkee & Co., New York,	761.
9688	"	Francis H. Leggett & Co., New York,	785.
	" average,		**773.**
9716	Singapore,	Austin, Nichols & Co., New York,	618.
9644	"	E. R. Durkee & Co., New York,	599.
	" average,		**608.**
9671	Siam,	Francis H. Leggett & Co., New York,	693.
9643	"	E. R. Durkee & Co., New York,	678.
9611	"	D. & L. Slade Co., Boston,	694.
	" average,		**688.**
9642	Penang,	E. R. Durkee & Co., New York,	679.
9672	"	Francis H. Leggett & Co., New York,	673.
9715	"	Austin, Nichols & Co., New York,	666.
	" average,		**673.**
	All analyses. Maximum,		785.
	All analyses. Minimum,		599.
	All analyses. Average,		

By-products, and Adulterants.

Weight of 100 corns, in grams.	Moisture.	Ash.			Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Total N. less N. in non-volatile ether extract × 6¼.	Nitrogen.		Parts of N. in 100 parts non-volatile ether extract.
		Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.						Total.	In non-volatile ether extract.	
4.06	12.43	3.68	2.26	0.15	1.10	7.80	9.35	41.36	37.50	11.67	12.31	2.28	0.31	3.92
5.26	11.88	3.09	1.75	0.13	1.08	7.92	8.95	43.47	36.81	10.76	13.81	2.53	0.32	4.05
5.46	11.47	3.54	2.04	0.07	1.08	7.36	8.77	43.26	39.32	10.84	12.19	2.25	0.30	4.02
5.20	12.07	3.63	2.25	0.12	1.04	7.71	8.75	43.02	39.24	11.20	12.13	2.25	0.31	4.00
4.49	12.16	3.53	2.22	0.12	0.99	7.78	8.62	42.89	39.66	10.75	13.12	2.41	0.31	3.95
4.89	**12.00**	**3.49**	**2.10**	**0.12**	**1.06**	**7.73**	**8.89**	**42.80**	**38.51**	**11.04**	**12.71**	**2.36**	**0.31**	**3.99**
4.77	11.86	4.28	2 75	0.00	0.65	6.86	8.47	41.80	37.01	12.23	11.88	2.17	0.27	3.90
4.13	11.27	4.14	2.75	0.02	1.02	7.02	9.14	41.55	37.01	12.17	11.70	2.14	0.27	3.88
4.45	**11.56**	**4.21**	**2.75**	**0.01**	**0.83**	**6.94**	**8.80**	**41.67**	**37.01**	**12.20**	**11.79**	**2.15**	**0.27**	**3.89**
3.43	10.63	6.52	2.16	1.19	1.11	8.67	9.49	37.09	33.41	12.72	11.37	2.15	0.33	3.82
3.55	12.17	4.86	2.21	0.48	1.23	9.05	9.95	41.42	37.59	11.57	10.50	2.03	0.35	3.85
3.49	**11.40**	**5.69**	**2.18**	**0.83**	**1.17**	**8.86**	**9.72**	**39.25**	**35.50**	**12.14**	**10.93**	**2.09**	**0.34**	**3.83**
3.44	12.09	5.04	2.78	0.48	1.09	9.17	10.04	38.17	33.30	13.07	10.88	2.11	0.37	4.06
2.66	12.95	6.15	3.04	1.15	1.15	9.03	9.95	36.40	33.08	14.09	11.75	2.25	0.37	4.06
2.67	11.84	6.10	3.01	1.04	1.28	9.47	10.28	31.41	26.81	16.40	12.25	2.34	0.38	4.01
2.12	12.33	6.35	3.19	1.00	1.60	9.64	11.07	28.15	22.05	18.25	12.56	2.39	0.38	3.99
2.18	12.33	5.73	3.20	0.64	1.58	10.37	11.86	30.82	25.39	17.08	12.25	2.36	0.40	3.90
2.61	**12.31**	**5.87**	**3.04**	**0.86**	**1.34**	**9.54**	**10.64**	**32.99**	**28.13**	**15.78**	**11.94**	**2.29**	**0.38**	**4.00**
5.46	12.95	6.52	3.2[illegible]	1.19	1.60	10.37	11.86	43.47	39.66	18.25	13.81	2.53	0.40	4.06
2.12	10.63	3.09	1.75	0.00	0.65	6.86	8.47	28.15	22.05	10.75	10.50	2.03	0.27	3.82
....	**11.96**	**4.76**	**2.54**	**0.47**	**1.14**	**8.42**	**9.62**	**38.63**	**34.15**	**13.06**	**12.05**	**2.26**	**0.33**	**3.96**
....	10.95	8.25	2.34	1.74	1.26	8.24	9.66	29.01	25.03	17.51	11.25	2.10	0.30	3.65
...	10.57	11.91	3.20	4.70	0.68	3.04	4.00	11.43	2.30	32.15	14.19	2.30	0.09	2.91
....	10.52	10.30	2.28	2.88	1.06	4.77	5.71	21.69	15.30	23.61	12.94	2.21	0.14	3.01
....	10.66	10.25	2.90	2.63	1.02	4.97	6.30	20.99	14.12	23.27	12.31	2.12	0.15	2.94
....	9.47	5.93	4.20	0.22	1.55	6.61	8.67	42.88	39.55	5.76	12.25	2.18	0.22	3.34
....	7.63	1.84	1.24	0.00	0.07	0.38	2.17	20.51	1.46	43.76	3.06	0.49	....	....
2.77	12.72	1.03	0.44	0.00	0.49	7.26	7.71	64.79	63.60	0.54	11.13	2.10	0.32	4.40
2.78	13.07	1.10	0.51	0.02	0.63	7.21	7.95	64.92	62.73	0.66	10.94	2.07	0.32	4.45
2.77	**12.89**	**1.06**	**0.47**	**0.01**	**0.56**	**7.24**	**7.83**	**64.85**	**63.16**	**0.60**	**11.03**	**2.08**	**0.32**	**4.42**
4.35	13.12	1.52	0.33	0.10	0.95	7.94	8.35	57.00	54.67	4.25	11.19	2.13	0.34	4.35
4.47	13.82	1.14	0.34	0.09	0.90	7.85	8.55	56.43	53.11	3.95	10.94	2.09	0.34	4.32
4.41	**13.47**	**1.33**	**0.33**	**0.09**	**0.92**	**7.89**	**8.45**	**56.71**	**53.89**	**4.10**	**11.06**	**2.11**	**0.34**	**4.33**
4.81	13.65	1.26	0.39	0.04	0.58	6.81	7.53	58.90	56.33	3.55	10.88	**2.03**	0.29	4.27
5.00	12.77	1.71	0.46	0.20	0.83	6.54	7.35	59.10	56.10	3.49	10.75	2.01	0.29	4.36
4.49	14.47	1.43	0.28	0.07	0.67	6.58	7.19	59.04	56.10	3 52	10.44	1.95	0.28	4.28
4.77	**13.63**	**1.47**	**0.38**	**0.10**	**0.69**	**6.64**	**7.36**	**59.01**	**56.18**	**3.52**	**10.69**	**2.00**	**0.29**	**4.30**
5.38	13.40	2.73	0.52	0.11	0.62	6.36	7.34	57.35	54.74	3.78	10.94	2.03	0.28	4.33
5.18	14.19	2.96	0.62	0.18	0.76	6.34	7.26	57.24	54.02	3.70	10.82	1.99	0.26	4.05
5.02	13.45	2.82	0.80	0.17	0.89	6.26	7.36	56.94	53.26	3.91	10.88	2.01	0.27	4.32
5.19	**13.68**	**2.84**	**0.65**	**0.15**	**0.76**	**6.32**	**7.32**	**57.17**	**54.01**	**3.80**	**10.88**	**2.01**	**0.27**	**4.23**
5.38	14.47	2.96	0.80	0.20	0.95	7.94	8.55	64.92	63.60	4.25	11.19	2.13	0.34	4.45
2.77	12.72	1.03	0.28	0.00	0.49	6.26	7.19	56.43	53.11	0.54	10.44	1.95	0.26	4.05
....	**13.47**	**1.77**	**0.47**	**0.10**	**0.73**	**6.91**	**7.66**	**59.17**	**56.47**	**3.14**	**10.89**	**2.04**	**0.30**	**4.31**

TABLE XXV.—

Station No.		Importer.	Weight of 100 pods in grams.
9720	Japan,	Austin, Nichols & Co., New York,	6.82
9679	"	Francis H. Leggett & Co., New York,	6.70
9610	"	D. & L. Slade Co., Boston,	7.14
	" average,		**6.89**
9721	Zanzibar,	Austin, Nichols & Co., New York,	4.27
9654	"	E. R. Durkee & Co., New York,	4.40
9626	"	D. & L. Slade Co., Boston,	4.50
	" average,		**4.39**
9653	Capsicums,	E. R. Durkee & Co., New York,	21.96
9695	"	Austin, Nichols & Co., New York,	23.31
	" average,		**22.63**
	All analyses, Maximum,		23.31
	All analyses, Minimum,		4.27
	Average,		

Cayenne Pepper.

Moisture.	Ash.			Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Total nitrogen.
	Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.						
5.78	5.80	4.54	0.14	1.02	20.89	25.46	8.19	1.46	21.44	13.75	2.20
5.61	5.96	4.93	0.05	1.16	21.15	23.77	7.15	1.35	21.95	14.63	2.34
6.45	5.18	4.17	0.08	0.78	21.81	23.19	7.65	0.80	21.65	13.44	2.15
5.95	**5.65**	**4.55**	**0.09**	**0.99**	**21.28**	**24.11**	**7.66**	**1.20**	**21.68**	**13.94**	**2.23**
4.86	5.43	3.40	0.18	1.99	18.37	21.52	8.91	0.84	24.91	13.31	2.13
6.87	5.61	3.36	0.19	1.24	17.17	23.22	9.31	0.84	24.34	13.94	2.23
3.67	5.24	3.30	0.11	2.57	19.11	25.64	9.04	0.90	23.44	13.31	2.13
5.13	**5.43**	**3.35**	**0.16**	**1.93**	**18.22**	**23.46**	**9.09**	**0.86**	**24.23**	**13.52**	**2.16**
7.08	5.15	4.13	0.20	0.73	21.16	24.42	8.95	0.84	20.69	13.56	2.17
5.48	5.08	4.02	0.23	1.34	21.56	27.61	8.55	1.06	20.35	13.38	2.14
6.28	**5.11**	**4.07**	**0.21**	**1.03**	**21.36**	**26.01**	**8.75**	**0.95**	**20.52**	**13.47**	**2.15**
7.08	5.96	4.93	0.23	2.57	21.81	27.61	9.31	1.46	24.91	14.63	2.34
3.67	5.08	3.30	0.05	0.73	17.17	21.52	7.15	0.80	20.35	13.31	2.13
5.73	**5.43**	**3.98**	**0.15**	**1.35**	**20.15**	**24.35**	**8.47**	**1.01**	**22.35**	**13.67**	**2.18**

TABLE XXVI.—GINGER AND

Station No.		Importer.	Moisture.
	Ginger.		
9618	Jamaica, bleached (limed), .	D. & L. Slade Co., Boston, . .	10.56
9723	" " " .	Austin, Nichols & Co., New York, .	10.57
	" " " average	...	**10.56**
9724	Jamaica, unbleached, . .	Austin, Nichols & Co., New York, .	11.72
9655	" " . .	E. R. Durkee & Co., New York, . .	10.27
9620	" " . .	D. & L. Slade Co., Boston, . . .	11.67
	" " average, .	.....	**11.22**
9678	Cochin, cut and scraped (limed),	Francis H. Leggett & Co., New York, .	9.97
9670	Cochin, rough washed, . .	" " " " .	9.96
9624	Cochin, A, B, C, . . .	D. & L. Slade Co., Boston, . . .	10.54
9657	" " . . .	E. R. Durkee & Co., New York, . .	10.33
	" " average, .	.....	**10.43**
9660	Cochin, D, ...	E. R. Durkee & Co., New York, . .	9.91
9697	"	Austin, Nichols & Co., New York, .	8.71
	" average, . .	.....	**9.31**
9656	Japan (limed), . . .	E. R. Durkee & Co., New York, . .	11.13
9725	" " . . .	Austin, Nichols & Co., New York, .	11.65
	" " average, . .	.....	**11.39**
9722	African, ...	Austin, Nichols & Co., New York, .	9.99
9659	"	E. R. Durkee & Co , New York, . .	9.89
9623	"	D. & L. Slade Co , Boston, . . .	10.03
	" average, . . .	.....	**9.97**
9658	Calcutta or East India, . .	E. R. Durkee & Co., New York, . .	10.19
9621	" " " " . .	D. & L. Slade Co., Boston, . . .	10.86
	" " " " average,	.....	**10.52**
	All analyses, Maximum,	.....	11.72
	All analyses, Minimum,	.....	8.71
	All analyses, Average,	.....	**10.44**
	Ginger By-Products.		
9681	Rough, scraggy ginger, rejections from Cochin D, .	.....	4.99
9693	Ginger cuttings, . . .	.....	3.19
9727	Exhausted ginger from English ginger ale works, . .	.....	10.61
9368	Exhausted ginger from extract works, ...	.....	8.02

Ginger By-Products.

Ash.				Ether extract.								
Total.	Soluble in water.	Insoluble in HCl.	Lime. (CaO.)	Volatile.	Non-volatile.	Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Cold water extract.	Total nitrogen.
9.35	2.32	0.03	3.53	1.34	2.82	4.04	56.00	53.95	2.37	9.00	15.68	1.44
7.28	2.95	0.02	1.92	1.21	3.43	5.37	58.63	55.61	2.38	9.69	16.10	1.55
8.31	**2.63**	**0.02**	**2.72**	**1.27**	**3.12**	**4.70**	**57.31**	**54.78**	**2.37**	**9.34**	**15.89**	**1.49**
4.72	3.40	0.51	0.28	1.76	3.97	5.23	58.41	56.13	4.28	6.25	14.81	1.00
4.18	2.84	0.11	0.30	1.61	3.82	4.90	56.31	55.05	3.72	9.75	17.55	1.50
3.61	2.64	0.05	0.20	2.01	3.94	5.32	58.05	57.10	3.17	7.56	14.73	1.21
4.17	**2.96**	**0.22**	**0.26**	**1.79**	**3.91**	**5.15**	**57.59**	**56.09**	**3.72**	**7.85**	**15.69**	**1.24**
5.36	2.95	0.08	1.29	1.49	2.95	3.63	62.42	60.31	2.60	7.50	13.22	1.20
3.81	2.42	0.12	0.24	2.47	4.50	6.19	56.65	53.94	4.22	8.00	12.66	1.28
3.66	2.62	0.15	0.25	1.86	3.64	4.89	59.73	58.05	3.68	8.06	12.18	1.29
4.06	2.18	0.06	0.71	2.32	3.75	4.36	58.43	56.62	3.57	8.25	12.66	1.32
3.86	**2.40**	**0.10**	**0.48**	**2.09**	**3.70**	**4.62**	**59.08**	**57.33**	**3 62**	**8.15**	**12.42**	**1.30**
5.48	2.89	0.68	0.56	2.52	5.08	5.98	53.43	49.86	5.10	7.88	12.04	1.26
4.96	2.67	0.23	0.55	3.09	5.15	5.55	53.97	49.05	5.50	7.81	12.41	1.25
5.22	**2.78**	**0.45**	**0.55**	**2.80**	**5.11**	**5.77**	**53.70**	**49.45**	**5 30**	**7.84**	**12.22**	**1.25**
4.34	1.73	0.15	1.07	0.96	3.86	5.18	61.02	58.70	2.62	6.00	12.72	0.96
8.04	1.89	1.28	2.26	0.96	4.02	4 86	60.08	55.40	2.84	4.81	10.92	0.77
6.19	**1.81**	**0.71**	**1.66**	**0.96**	**3.94**	**5.02**	**60.55**	**57.05**	**2.73**	**5.40**	**11.82**	**0.86**
4.14	2.73	0.14	0.26	2.66	5.42	6.30	57.15	53.36	4.31	7.94	13.31	1.27
3.61	2.17	0.08	0.28	2.94	5.28	6.58	57.42	53.08	4.74	7.88	12.38	1.26
4.24	2.65	0.11	0.21	2.60	5.34	6.14	55.65	51.60	4.93	7.94	13.61	1.27
4.00	**2.52**	**0.11**	**0.25**	**2.73**	**5.35**	**6.34**	**56.74**	**52.68**	**4.66**	**7.92**	**13.10**	**1.27**
7.55	4.09	2.29	0.26	1.73	3.37	4.37	55.39	52.48	5.37	7.69	12.51	1.23
6.47	3.60	1.74	0.27	1.84	3.52	4.29	55.62	51.24	5.08	7.25	12.04	1.16
7.01	**3.84**	**2.01**	**0.26**	**1.78**	**3.44**	**4.33**	**55.50**	**51.85**	**5.22**	**7.47**	**12.27**	**1.19**
9.35	4.09	2.29	3.53	3.09	5.42	6.58	62 42	60.31	5.50	9.75	17.55	1.55
3.61	1.73	0 02	0.20	0.96	2.82	3.63	53.43	49.05	2.37	4.81	10.92	0.77
5.27	**2.71**	**0.44**	**0.80**	**1.97**	**4.10**	**5.18**	**57.45**	**54.53**	**3.91**	**7.74**	**13.42**	**1.23**
8.05	4.03	0.89	0.61	6.05	9.55	11.60	31.38	19.35	13.18	7.00	14.65	1.12
9.20	3.90	1.81	1.06	7.06	2.76	9.20	40.23	31.14	8.69	8.69	17.72	1.39
2.12	0.59	0.18	.....	1.61	3.86	4.88	59.86	54.57	5.17	6.94	6.15	1.11
5.05	3.55	1.50	.....	0.13	0 54	1.52	.....	.....	.....	.....	16.42	.....

TABLE XXVII.—CEYLON CINNAMON,

Station No.		Importer.	Moisture.
	Ceylon Cinnamon.		
9668	No. 1, extra,	E. R. Durkee & Co., New York,	7.92
9667	No. 1,	" " "	7.90
9666	No. 2,	" " "	7.79
9699	"	Austin, Nichols & Co., New York,	9.34
9640	No. 4,	E. R. Durkee & Co., New York,	8.33
9680	Chips,	Francis H. Leggett & Co., N. York	10.48
	All analyses, Maximum,		10.48
	All analyses, Minimum,		7.79
	All analyses, Average,		8.63
	Cassia.		
9635	Saigon, thin,	E. R. Durkee & Co., New York,	7.48
9629	"	D. & L. Slade Co., Boston,	6.53
9634	Saigon, medium,	E. R. Durkee & Co., New York,	7.55
9633	Saigon, thick,	" " "	7.06
9628	"	D. & L. Slade Co., Boston,	7.95
9636	Saigon, broken, No. 1,	E. R. Durkee & Co., New York,	7.56
9707	" "	Austin, Nichols & Co , New York,	9.12
9698	Saigon, broken, No. 2,	" " "	7.89
	Saigon, average, all analyses,		7.64
9705	Batavia, No. 1,	Austin, Nichols & Co , New York,	8.73
9637	"	E. R. Durkee & Co., New York,	9.53
9627	"	D. & L. Slade Co., Boston,	8.65
9700	Batavia, No. 2,	Austin, Nichols & Co., New York,	9.92
9638	"	E. R. Durkee & Co., New York,	9.01
9686	"	Francis H. Leggett & Co., N. York,	10.16
	Batavia, average, all analyses,		9.33
9704	China or Canton, No. 1, extra,	Austin, Nichols & Co., New York,	11.91
9706	China or Canton, No. 1,	" " "	11.71
9639	" " "	E. R. Durkee & Co., New York,	11.13
9687	" " "	Francis H. Leggett & Co., N. York,	10.95
9630	" " "	D. & L. Slade Co , Boston,	10.87
9708	China or Canton, broken,	Austin, Nichols & Co., New York,	11.08
9737*	" " "		8.90
9631	Coarse, from No. 9737, 47 per cent.,		10.09
9632	Fine, from No. 9737, 53 per cent.,		7.84
	China, average, all analyses, excluding Nos. 9737, 9631, and 9632,		11.27
	All analyses, excluding Nos. 9737, 9631, and 9632, Maximum,		11.91
	All analyses, excluding Nos. 9737, 9631, and 9632, Minimum,		6.53
	All analyses, excluding Nos. 9737, 9631, and 9632, Average,		9.24
	Cassia Buds.		
9665	No particulars given,	E. R. Durkee & Co., New York,	7.12
9609	" "	D. & L. Slade Co., Boston,	8.74
	Average,		7.93

* Contained large amount of dirt; unfit for consumption until cleaned by sifting.

Cassia, and Cassia Buds.

Ash.			Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Crude fiber.	Nitrogen × 6¼.	Total nitrogen.
Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.					
4.16	1.40	0.03	1.46	1.38	12.74	17.55	38.48	4.06	0.65
4.41	2.08	0.05	1.49	1.42	12.70	19.53	38.09	3.69	0.59
4.33	1.61	0.09	1.62	1.46	12.40	22.00	36.40	3.50	0.56
4.41	1.62	0.03	1.49	1.37	11.85	20.12	34.61	3.94	0.63
5.99	2.71	0.02	1.54	1.35	13.60	19.98	35.23	3.25	0.52
5.63	1.79	0.58	0.72	1.68	9.97	16.65	34.38	3.75	0.60
5.99	2.71	0.58	1.62	1.68	13.60	22.00	38.48	4.06	0.65
4.16	1.40	0.02	0.72	1.35	9.97	16.65	34.38	3.25	0.52
4.82	**1.87**	**0.13**	**1.39**	**1.44**	**12.21**	**19.30**	**36.20**	**3.70**	**0.59**
4.78	1.64	0.38	4.88	3.26	5.63	18.36	21.38	5.06	0.81
4.17	2.05	0.17	4.85	3.09	8.70	25.38	17.31	4.63	0.74
4.80	2.02	0.25	5.15	2.34	7.91	25.29	22.65	3.75	0.60
5.99	2.52	0.21	3.94	2.43	5.49	21.37	28.80	3.63	0.58
5.08	2.07	0.08	4.58	2.37	5.14	24.61	25.41	3.75	0.60
6.20	2.28	0.98	3.67	2.55	3.92	20.74	25.09	4.50	0.72
5.08	1.81	0.68	2.43	2.78	6.87	20.57	24.95	4.25	0.68
5.73	2.13	0.21	2.84	4.13	9.16	18.36	25.45	3.87	0.62
5.23	**2.06**	**0.37**	**4.04**	**2.87**	**6.60**	**21.83**	**23.88**	**4.18**	**0.67**
4.75	1.83	0.04	1.59	1.49	16.74	26.95	19.17	4.50	0.72
4.04	1.49	0.06	2.61	1.32	12.39	25.60	17.03	4.88	0.78
4.73	1.85	0.02	2.47	1.45	13.31	20.25	20.31	4.63	0.74
4.46	1.64	0.05	1.23	1.42	13.07	21.15	21.02	5.32	0.85
5.12	1.90	0.05	1.95	1.51	14.50	16.65	22.09	5.19	0.83
4.37	1.63	0.05	2.12	1.39	11.00	18.68	21.51	5.44	0.87
4.58	**1.72**	**0.04**	**1.99**	**1.43**	**13.50**	**21.55**	**20.19**	**4.99**	**0.80**
3.01	1.58	0.10	0.93	1.56	4.57	32.04	23.80	3.31	0.53
3.65	1.06	0.78	1.06	1.87	4.71	27.45	23.66	3.94	0.63
3.47	0.71	1.31	1.44	1.67	7.80	30.28	23.08	3.44	0.55
5.37	0.98	2.42	1.64	1.70	5.21	28.13	23.97	3.94	0.63
4.18	1.28	1.07	1.30	1.75	4.90	24.03	25.70	4.13	0.66
5.58	1.21	2.22	1.48	2.27	4.73	20.57	26.83	4.56	0.73
20.00	1.04	15.47	0.84	1.79	3.76	17.35	24.66	4.18	0.67
4.20	1.30	1.11	1.36	2.27	5.18	22.37	26.51	4.31	0.69
34.02	0.81	28.21	0.37	1.38	2.50	12.91	23.03	4.06	0.65
4.21	**1.14**	**1.32**	**1.31**	**1.80**	**5.32**	**27.08**	**24.51**	**3.89**	**0.62**
6.20	2.52	2.42	5.15	4.13	16.74	32.04	28.80	5.44	0.87
3.01	0.71	0.02	0.93	1.32	4.57	16.65	17.03	3.31	0.53
4.73	**1.68**	**0.56**	**2.61**	**2.12**	**8.29**	**23.32**	**22.96**	**4.34**	**0.69**
4.58	2.88	0.19	4.65	6.27	16.90	10.44	13.89	8.00	1.28
4.70	2.88	0.35	3.11	5.65	10.86	10.98	12.80	7.06	1.13
4.64	**2.88**	**0.27**	**3.88**	**5.96**	**10.88**	**10.71**	**13.35**	**7.53**	**1.20**

TABLE XXVIII. CLOVES AND

Station No.		Importer.	Weight of 100 cloves in grams.	Moisture.
	Cloves.			
9711	Penang,	Austin, Nichols & Co., New York,	10.04	8.16
9625	"	D. & L. Slade Co., Boston,	8.51	7.81
	" average,		**9.28**	**7.99**
9710	Amboyna,	Austin, Nichols & Co., New York,	9.26	7.36
9669	"	Francis H. Leggett & Co , N. York,	10.34	8.06
9622	"	D. & L. Slade Co., Boston,	9.58	8.26
	" average,		**9.73**	**7.89**
9709	Zanzibar,	Austin, Nichols & Co , New York,	7.64	7.03
9651	"	E. R. Durkee & Co., New York,	8.22	7.93
9612	"	D. & L. Slade Co., Boston,	8.15	7.89
	" average,		**8.00**	**7.62**
	All analyses, Maximum,		10.34	8.26
	All analyses, Minimum,		7.64	7.03
	All analyses, Average,		**8.97**	**7.81**
	Clove Stems (adulterant).			
9691	Particulars unknown,			7.93
9652	" "			9.54
	Average,			**8.74**

Clove Stems.

Ash.			Ether extract.									
Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.	Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Oxygen absorbed by aqueous extract.	Quercitannic acid equivalent to O absorbed.	Total nitrogen.
5.28	3.25	0.05	17.99	6.61	15.58	9.41	2.59	7.94	6.44	2.42	18.90	1.03
5.30	3.48	0.00	20.04	6.25	14.86	8.91	2.70	7.85	7.06	2.36	18.38	1.13
5.29	**3.37**	**0.03**	**19.02**	**6.43**	**15.22**	**9.16**	**2.65**	**7.90**	**6.75**	**2.39**	**18.64**	**1.08**
6.16	3.57	0.02	20.53	6.39	15.20	8.23	3.15	7.97	6.00	2.17	16.90	0.96
6.22	3.72	0.02	20.42	6.63	15.21	8.87	2.59	8.11	5.94	2.08	16.25	0.95
6.17	3.56	0.08	20.45	6.67	15.18	8.19	2.65	7.06	5.94	2.14	16.77	0.95
6.18	**3.62**	**0.04**	**20.47**	**6.56**	**15.20**	**8.43**	**2.80**	**7.71**	**5.96**	**2.13**	**16.64**	**0.95**
5.96	3.61	0.13	17.86	6.24	14.68	9.18	3.15	8.24	6.25	2.63	20.54	1.00
6.22	3.75	0.08	17.82	6.59	13.99	9.50	2.97	9.02	5.88	2.34	18.28	0.94
6.02	3.67	0.10	18.32	6.53	14.25	9.63	2.08	8.60	5.94	2.49	19.50	0.95
6.07	**3.68**	**0.10**	**18.00**	**6.45**	**14.31**	**9.44**	**2.73**	**8.62**	**6.02**	**2.49**	**19.44**	**0.96**
6.22	3.75	0.13	20.53	6.67	15.58	9.63	3.15	9.02	7.06	2.63	20.54	1.13
5.28	3.25	0.00	17.82	6.24	13.99	8.19	2.08	7.06	5.88	2.08	16.25	0.94
5.92	**3.58**	**0.06**	**19.18**	**6.49**	**14.87**	**8.99**	**2.74**	**8.10**	**6.18**	**2.33**	**18.19**	**0.99**
7.68	4.43	0.48	5.13	3.92	7.88	14.53	1.91	18.73	6.00	2.61	20.41	0.96
8.29	4.08	0.71	4.87	3.73	5.70	13.72	2.42	18.69	5.75	2.19	17.16	0.92
7.99	**4.26**	**0.60**	**5.00**	**3.83**	**6.79**	**14.13**	**2.17**	**18.71**	**5.88**	**2.40**	**18.79**	**0.94**

TABLE XXIX.—

Station No.		Importer.	Weight of 100 corns in grams.	Moisture.
9703	Jamaica,	Austin, Nichols & Co., N. Y.,	8.30	9.45
9661	do	E. R. Durkee & Co., N. Y.,	6.61	9.75
9613	do	D. & L. Slade Co , Boston,	5.32	10.14
	All analyses, Maximum,	.....	8.30	10.14
	All analyses, Minimum,	.....	5.32	9.45
	All analyses, Average.	.....	**6.74**	**.78**

TABLE XXX.—

Station No.		Importer.	Weight of 100 nutmegs in grams.
	True Nutmegs, limed.		
9617	Singapore, ...	D. & L. Slade Co., Boston, .	423
9664	Probably Singapore, . .	E. R. Durkee & Co , N. Y., .	405
9719	" " . .	Austin, Nichols & Co., N. Y.,	390
	Average, Nos. 9617, 9664 & 9719	.....	**406**
9673	Padang, ...	Francis H. Leggett & Co., N.Y.,	255
	All analyses, Maximum,	.....	423
	All analyses, Minimum,	.....	255
	Macassar or Long Nutmegs.		
9674	Limed, ...	.....	575
	Damaged Nutmegs.		
9696	"Grinding Nutmegs," (worm eaten), ...	.....	104

ALLSPICE OR PIMENTO.

Ash.			Ether extract.									
Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.	Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Oxygen absorbed by aqueous extract.	Quercitannic acid equivalent to O, absorbed.	Total Nitrogen.
4.15	2.43	0.00	3.57	7.72	14.27	20.65	3.76	20.46	5.19	1 10	8.58	0.83
4.76	2.69	0.03	3.38	5.46	13 71	16.87	1.82	23.98	5.69	1.59	12.48	0.91
4.50	2.29	0.06	5.21	4.35	7.39	16.56	3.54	22.74	6.37	1.03	8.06	1.02
4.76	2.69	0.06	5.21	7.72	14.27	20.65	3.76	23.98	6.37	1.59	12.48	1.02
4.15	2.29	0.00	3.38	4.35	7 39	16.56	1.82	20.46	5.19	1.03	8.06	0.83
4.47	**2.47**	**0.03**	**4.05**	**5.84**	**11.79**	**18.03**	**3.04**	**22.39**	**5.75**	**1.24**	**9.71**	**0.92**

NUTMEGS.

Moisture.	Ash.			Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fibre.	Nitrogen × 6¼.	Total Nitrogen.
	Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.						
5.79	2.23	0.84	0.00	3.40	36.87	10.80	25.60	23.34	2.49	7.00	1.12
8.98	2.13	0.82	0.01	2.56	36.29	10.42	25.56	23.62	2.38	6.56	1.05
8.12	2.48	0.93	0.00	3.10	36.94	11.09	25.51	24.20	2.65	6.62	1.06
3.63	**2.28**	**0.86**	**0.00**	**3.02**	**36.70**	**10.77**	**25.56**	**23.72**	**2.51**	**6.73**	**1.08**
10.83	3.26	1.46	0.00	6.94	28.73	17.38	17.19	14.62	3.72	6.75	1.08
10.83	3.26	1.46	0.01	6.94	36.94	17.38	25.60	24.20	3.72	7.00	1.12
5.79	2.13	0.82	0.00	2.56	28.73	10.42	17.19	14.62	2.38	6.56	1.05
5.24	3.32	1.25	0.00	4.70	32.88	16.79	29.97	29.25	2.07	6.95	1.11
17.23	6.37	4.33	0.12	9.76	11.32	14.71	5.71	1.63	7.95	9.73	1.49

TABLE XXXI. — ANALYSES OF

Station No.		Importer.
	True Mace:	
9619	Banda,	D. & L. Slade Co., Boston,
9662	Penang,	E. R. Durkee & Co., New York,
9717	"	Austin, Nichols & Co., New York,
9677	" No. 2,	Francis H. Leggett & Co., New York,
9694	"Grinding Mace" (damaged),	
	All analyses, excluding No. 9694, Maximum,	
	All analyses, excluding No. 9694, Minimum,	
	All analyses, excluding No. 9694, Average,	
	Other Varieties of Mace	
9675	Macassar,	
9676	Bombay (adulterant),	

TABLE XXXII. — MISCELLANEOUS

Station No.		Moisture.	Ash.		
			Total.	Soluble in water.	Insoluble in HCl.
9718	English-walnut shells,	7.69	1.40	0.77	0.00
9728	Brazil-nut shells,	9.08	1.59	1.06	0.17
9730	Almond shells,	7.80	2.86	2.39	0.05
9735	Cocoanut shells,	7.36	0.54	0.50	0.00
9729	Date stones,	8.24	1.24	0.76	0.04
9733	Spruce sawdust,	8.77	0.23	0.16	0.00
9734	Oak sawdust,	5.73	1.22	0.32	0.02
9731	Linseed meal,	8.71	5.72	1.74	0.55
7830	Cocoa shells,	10.44	8.40	4.66	0.83
9736	Red sandalwood,	4.42	0.70	0.28	0.07

Mace.

Moisture.	Ash.			Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Total Nitrogen.
	Total.	Soluble in water.	Insoluble in HCl.	Volatile.	Non-volatile.						
10.75	1.81	1.09	0.00	8.65	22.00	23.05	32.35	27.90	3.04	6.25	1.00
12.04	1.85	1.06	0.06	6.27	22.56	22.07	34.42	30.43	2.99	6.37	1.02
9.78	1.85	1.06	0.03	6.97	21.63	22.58	33.39	30.04	2.94	6.25	1.00
11.62	2.54	1.33	0.21	8.45	23.72	24.76	26.77	23.12	3.85	7.00	1.12
12.51	5.74	2.37	1.13	14.97	20.96	22.27	8.32	4.73	7.64	10.94	1.75
12.04	2.54	1.33	0.21	8.65	23.72	24.76	34.42	30.43	3.85	7.00	1.12
9.78	1.81	1.06	0.00	6.27	21.63	22.07	26.77	23.12	2.94	6.25	1.00
11.05	**2.01**	**1.13**	**0.07**	**7.58**	**22.48**	**23.11**	**31.73**	**27.87**	**3.20**	**6.47**	**1.03**
4.18	2.01	1.11	0.03	5.89	53.54	32.89	10.39	8.78	4.57	7.00	1.12
0.32	1.98	1.37	0.07	4.65	59.81	44.27	16.20	14.51	3.21	5.06	0.81

Spice Adulterants.

Ether extract.		Alcohol extract.	Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen × 6¼.	Oxygen absorbed by aqueous extract.	Quercitannic acid equivalent to O, absorbed.	Total Nitrogen.
Volatile.	Non-volatile.								
0.12	0.55	1.84	19.30	1.01	56.58	1.69	0.53	2.08	0.27
0.07	0.57	1.01	12.96	0.73	50.98	4.19	0.33	1.30	0.67
0.16	0.64	5.16	22.72	0.84	49.89	1.75	0.40	1.56	0.28
0.00	0.25	1.12	20.88	0.73	56.19	1.13	0.47	1.82	0.18
0.36	8.38	16.72	20.88	2.19	5.72	5.31	0.61	2.34	0.85
0.07	0.77	1.50	15.48	1.13	64.03	0.56	0.30	1.17	0.09
0.07	0.84	6.25	17.10	1.68	47.79	1.63	3.13	12.22	0.26
0.04	6.58	9.46	21.15	14.06	8.30	31.81	1.00	3.90	5.09
1.00	2.99	4.77	8.68	3.15	14.12	16.19	1.26	4.94	2.59
1.21	11.47	19.37	6.79	1.12	52.30	3.06	0.59	2.29	0.49

Discussion of Analyses.

The analyses reported herewith, in the tables on pages 198 to 211, together with those made at the Department of Agriculture, should serve as sufficient data for fixing standards of purity for these spices; but it is not the purpose of this article to formulate a set of standards, as that work has already been undertaken by the Association of Official Agricultural Chemists.

A discussion of the analyses of each spice follows:

Black Pepper.

Of the methods employed in our work the determinations of the non-volatile ether extract and of the nitrogen in this extract furnish the most valuable means of detecting adulterants of vegetable origin in both black and white pepper.

When a sample of black pepper is adulterated with buckwheat hulls, cocoanut shells, or some other material deficient in ether extract, the percentage of non-volatile extract will be diminished, without changing perceptibly the parts of nitrogen in 100 parts of the extract; but when the sample is mixed with linseed meal or some other oily material, the percentage of non-volatile ether extract may remain about the same as in the original pepper, but the parts of nitrogen in 100 of the extract will be reduced.

The nitrogen content of the extract of the samples analyzed is quite constant, varying only from 3.82 to 4.06 parts in 100 of the extract.

Both the alcohol and ether extracts are highest in Acheen black pepper, the cheapest grade on the market, and for this reason a considerable amount of adulterant in Acheen pepper might not be disclosed by a determination of either of these extracts.

The starch and reducing matters, by direct inversion, are highest in the best grades of black pepper, and lowest in the cheapest grades, while the reverse is true of fibre, total ash,

and ash soluble in water, and ash insoluble in HCl. Determination of these six ingredients may be useful to some extent in ascertaining the quality of a sample, if not its purity.

From our analyses, it appears that genuine black pepper of low grade may contain more than 5 per cent. of ash and 14 of fiber, which are given in the Austrian codex as the maxima; although 2 per cent. of sand, the maximum of the codex, has not been exceeded in any of our analyses. The per cent. of nitrogen and of albuminoids in adulterated pepper may be either greater, less, or the same as in the genuine pepper, depending on the nature of the adulterant used.

White Pepper.

Determinations of the ether and alcohol extracts and of nitrogen in the ether extract are the best means of detecting starchy adulterants. The parts of nitrogen in 100 of ether extract range from 4.05 to 4.45.

If olive stones, nut shells, sawdust, or similar materials are used as adulterants, determinations of starch (best by the diastase method) and of fiber will be valuable for their detection.

In all cases the percentages of total ash in pure white pepper are below 3 per cent., the maximum of the Austrian codex. The percentage of nitrogen and albuminoids will not usually furnish evidence of adulteration.

Cayenne Pepper.

The percentages of non-volatile ether extract range from 17.17 to 21.81, and of alcohol extract, from 21.52 to 27.61. These figures are much higher than in farinaceous materials, fruit stones, nut shells, and most of the other cayenne adulterants. Determination of starch by the diastase method is of great value when farinaceous matter is present. Red sandal wood is not readily detected by any of the methods just mentioned, but, if present in considerable amount, a determination of fiber should furnish valuable evidence. Other woods, nut shells, fruit stones, also increase the per cent. of fiber.

All of the samples contain less than 6 per cent. of ash, the limit of the Austrian codex.

Ginger.

The composition of the cereal products which are usually employed as ginger adulterants is not very different from that of pure ginger, and the microscope must usually be depended on to detect such materials.

Adulterated ginger may show a deficiency of volatile ether extract, but, as genuine ginger sometimes contains less than 1 per cent., a low percentage of volatile ether extract alone is not sufficient evidence of adulteration.

The highest per cent. of calcium oxide in any of the samples not evidently limed is 0.71, but in the limed samples the percentages range from 1.07 to 3.53. As carbonate and sulphate of lime are used to adulterate ground ginger, it should be determined whether the grinding of limed ginger is legitimate, and, if so, what maximum of lime should be allowed in ground ginger.

The two samples of exhausted ginger examined differ widely from each other in composition. No. 9727, the sample from the ginger-ale works, having been treated with water, is deficient in cold-water extract, water-soluble ash, and alcohol extract, but not in ether extract. The other sample, No. 9368, which was obtained from the extract factory, contains the full amount of cold-water extract and water-soluble ash, but is strikingly deficient in alcohol extract and ether extract, both volatile and non-volatile, and must have been extracted with some solvent other than water — probably strong alcohol.

Acetic acid is used in this country by some of the extract manufacturers, but we have no figures which show the composition of ginger after extraction by this solvent.

Cinnamon, Cassia, and Cassia Buds.

The only marked difference between Ceylon cinnamon and cassia, brought out by the analyses, is in the fiber, the former containing an average of 36.20, the latter of 22.96 per cent.

Cassia buds have a higher percentage of non-volatile ether extract and nitrogen, and a lower percentage of fiber, than the bark, but are otherwise similar in composition.

Saigon cassia contains more volatile oil than the Batavia and China varieties, and Ceylon cinnamon. Batavia cassia and

Ceylon cinnamon have about twice as much alcohol extract as Saigon or China cassia.

We have also found that Batavia cassia differs from the other varieties, in that it contains a gum which, on treatment with water or weak alcohol, forms a glutinous paste. (See foot note, p. 187).

The analyses of the sample of broken China cassia, No. 9737, and of the coarse and fine materials obtained from this sample by sifting, show to what extent cassias may be mixed with dirt in China.

Ground cassia should not contain more than 7 per cent. of ash and little, if any, more than 2 per cent. of sand.

Aside from determination of ash, it is doubtful if chemical analysis of cassia will be of use in detecting adulteration.

Cloves.

This spice is rich in volatile ether extract, alcohol extract, and tannin, and determination of these constituents will usually be sufficient when only non-starchy adulterants have been detected by the microscope.

As cloves contain no starch, a test with iodine solution will disclose farinaceous matter, or any other foreign material containing starch.

By the diastase method a small amount of reducing matter is obtained (1.91 to 2.42 per cent. calculated as starch), but the amount is too small to impair the usefulness of this method as a means of disclosing starchy adulterants. The samples of cloves examined contain less than 10 per cent. of fiber and between 0.94 and 1.13 per cent. of nitrogen.

There is no common adulterant which does not differ radically in composition from cloves, in respect to several ingredients.

Red sandal wood cannot be readily detected by the determination of starch or alcohol extract, but it contains almost no volatile ether extract and has six times as much fiber as cloves.

The Austrian codex states that pure cloves will not contain more than 8 per cent. of ash. Our figures are well within this limit.

Clove stems have about one-quarter as much volatile oil, half as much fixed oil and alcohol extract, and over twice as much fiber as cloves.

Allspice.

The samples analyzed differ materially in composition. Clove stems, a common adulterant, cannot probably be distinguished from allspice by chemical analysis.

On comparing the analyses of allspice with the analysis of cocoanut shells in Table XXXII, p. 210, it will be seen that the two materials are radically different in composition, and that this adulterant, when present in considerable amount, can be detected by analysis.

Nutmeg.

True and long nutmegs have about the same chemical composition. The addition of almost any available adulterant, excepting oil seeds or oil cake, will tend to lower the percentage of volatile and non-volatile ether extract. When shells or sawdust are present, fiber determinations should be made.

As the starchy matter of the sample of grinding nutmegs had been eaten out by insects (see description of sample), only 1.63 per cent. of starch was found by the diastase method. The percentage of fixed oil is also much lower than in sound nutmegs, but that of volatile oil is abnormally high, due, probably, to the removal of other matters.

Mace.

True mace is readily distinguished from Macassar or Bombay mace by the percentage of fixed oil and starch, as shown in the following statement:

	Non-volatile ether extract.	"Starch" by diastase method.
True mace (Aver., Nos. 9619, 9662, 9717),	22.48	27.87
Macassar mace, ...	55.54	8.78
Bombay mace, ...	59.81	14.51

None of the varieties contains starch, in the ordinary acceptance of the term, as iodine produces a red and not a blue coloration. Tschirch* has shown, however, that the irregular

* Ber. d. Deutsch. bot. Ges., 6, 1888, 138. See also Tschirch, Angewandte Pflanzen-anatomie, 1888, pp. 99 and 100, and same author, Anatomischer Atlas, 1887, pp. 252 and 253.

shaped granules which are evident under the microscope consist of starch granules impregnated with amylodextrin, to which granules he has given the name, "amylodextrin-starch."

Our experiments show that this carbohydrate is readily soluble in diastase, and may be determined by the diastase method.

The results thus obtained are valuable as a means of detecting adulteration, and of distinguishing true from Macassar and Bombay mace.

Note on the Chemical Composition of Mustard Flour.

Pure mustard flour is prepared from one variety of mustard seed, or from a mixture of different varieties, with the removal of the hulls and usually of a portion of the fatty oil. As the product contains only a portion of the seed, standards of purity cannot be based on analyses of the whole seed from which it is prepared.

No analyses of mustard seed or of authenticated samples of mustard flour have been made at this Station, but on page 168 are given analyses of 26 brands of mustard flour sold in sealed packages bearing the names of the manufacturers.

The maxima, minima, and average results of the analyses of 18 samples which were not found adulterated or artificially colored, either by chemical or microscopical examination, are as follows:

	Total ash.	Ether extract.		Reducing matters by direct inversion calculated as starch.	Starch by diastase method.	Crude fiber.	Nitrogen, × 6¼.
		Volatile.	Non-volatile.				
Maximum,	7.35	1.90	28.10	6 12	2.08	4.87	43.56
Minimum,	4.81	0 00	17.14	1.85	0.28	1.58	35.63
Average,	5.99	0.56	20.61	4.33	1.07	2.58	39.57

WHEAT FLOUR.

By A. L. Winton.

A sample of flour bought in another State and referred to this station for examination was found to contain a considerable quantity of maize starch.

To discover whether the flour sold in Connecticut markets is adulterated in this way, twenty-five different brands of flour were bought and carefully examined microscopically. No evidence of any form of adulteration was found.

The names of the brands examined, and of the dealers from whom they were bought are given in Table XXXIII.

TABLE XXXIII. — WHEAT FLOUR NOT FOUND ADULTERATED.

Station No.	Brand.	Dealer.
9602	The King's Best, H. H. King & Co., Minneapolis,	*Hartford.* K. Goldberg, 66 Talcott St.
9603	Townshend's Butterfly, Stillwater, Minn.,	T. A. Shaw, 535 Main St.
9604	Crocker's Best XXXX, Minneapolis,	T. A. Shaw, 535 Main St.
9601	Shumacher's White Cloud, Akron, O ,	E. P. Yates & Co., 711 Main St.
9436	White Seal Fancy Patent, Norton & Co , Chicago,	*New Haven.* Edward Boyhan, 554 Grand Ave.
9443	The Hoosier Hulled Whole Wheat Flour, Seymour, Ind.,	I. B. Chandler, 101 Dixwell Ave.
7806	Fancy Roller Process Hungarian Patent, Pt. Jefferson Milling Co , L. I.,	Geo. W. Clark, 987 State St.
9437	Roller Process Princess, Fancy Family, St. Louis,	G. W. Cooper, Grand Ave. & Artizan St.
9442	Jones Hungarian Superlative, Hecker, Jones, Jewell Milling Co.,	A. F. Copeland, 1206 State St.
9444	Staten Island Milling Co.'s Fancy Patent, Minnesota,	J. L. Folley, Grand Ave. & Bradley St.
9440	Pillsbury's Best XXXX, Pillsbury Washburn Flour Mills, M'apolis,	Philip Hugo, Edward & Nash Sts.
9438	Prima Donna, Anchor Mill Co., Superior,	F. A. Hull, 399 Grand Ave.
9439	White Loaf, Bryan, Miner & Read, New Haven,	Conrad Rausch, Foster & Avon Sts.
9441	Gold Medal, Washburn Crosby Co., Minneapolis,	J. J. Sullivan, Nash & Eagle Sts.
9445	Daily Bread, Liberty Mills,	389 Grand Ave.
9701	Wilson's Choice White Rose Pastry Flour,	*New London.* M. Wilson Dart, Howard & Bank Sts.
9702	Bridal Veil, Central Milling Co., Buffalo,	Edward Keefe, 495 Bank St.
9487	Schumacher's Patent, Akron, Ohio,	*Waterbury.* D. L. Dickenson, 431 W. Main St.
9485	Christian's Superlative, Pettit Mills, Minneapolis,	Dillon's Cash Store, 43 E. Main St.
9486	Gold Seal Fancy Patent, The F. C. Bushnell Co., New Haven,	N. W. Heater, 157 E. Main St.
9488	The Angelus, Thompson Milling Co., Lockport, N. Y.,	798 Bank St.
9523	Fancy Patent Superlative, E. G. W. & Co., Minneapolis,	*W. Winsted.* Chas. Smith, Main St.
7970	Schumacher's XXX Graham, Akron, Ohio,	*Willimantic.* H. Levin, 493 Main St.
9521	Ceresota, Western Consolidated Milling Co., Minneapolis,	*Winsted.* I. K. Camp, Main St.
9522	Peerless XXXX, E. G. W. & Co., St Louis,	Larkin & Sparks, Main St.

FOOD PRODUCTS EXAMINED FOR THE DAIRY COMMISSIONER IN THE YEAR ENDING JULY 31, 1897.

By E. H. Jenkins.

A considerable part of the chemical and polariscopic work here described was done by Messrs. Winton, Ogden & Mitchell. All adulterated samples were also examined by Mr. Jenkins, who was summoned to attend court cases of prosecution for violation of the law.

Vinegar.

Thirty-two samples sent by the Dairy Commissioner were examined during the twelvemonth ending July 31, 1897.

Solids. Of the samples marked "cider vinegar",
3 had between 1.0 and 1.5 per cent. of solids.
9 " " 1.5 " 2.0 " " "
16 " over 2.00 per cent. of solids.
The highest percentage found was 3.57.

Acidity. Of the samples marked "cider vinegar",
2 had between 2.5 and 3.0 per cent. of acidity.
1 " " 3.0 and 3.5 " " " "
5 " " 3.5 " 4.0 " " " "
20 " over 4.0 per cent. of acidity.
The highest percentage found was 6.41.

Three samples marked "White Wine Vinegar" contained from 0.15 to 0.25 per cent. of solids, and from 4.53 to 4.60 per cent. of acidity.

Molasses.

Two hundred and three samples of molasses and syrups have been examined in the year ending July 31, 1897.

Method of Examination. — 13.024 grains (one-half the normal weight) of molasses were dissolved in about 80 cc. of water, 3 cc. of basic lead acetate were added, the volume was made up to 100 cc. and the whole was thoroughly mixed

and passed through a dry filter. The rotation of the clear and nearly colorless filtrate was determined, in a 200 mm. tube, with a Schmidt and Haensch half shade double compensation polariscope. The reading, doubled, gave the sugar degrees or per cent. No correction was attempted for the volume of the lead precipitate.

To 50 cc. of the filtrate referred to above, were added 5 cc. conc. C. P. hydrochloric acid, and, after thorough mixing, the flask containing the solution was placed in a cold water bath, which was then quickly heated to 68° C. After standing at that temperature for 10 minutes, the contents of the flask were quickly cooled and the solution, filtered from lead chloride when necessary, was examined in a 220 mm. tube, provided with a water jacket. The temperature was noted with the reading. This reading, doubled, gave the sugar degrees after inversion.

Water, heated to 86° C., was then passed through the jacket and a third reading made at that temperature.

The rotatory power of dextrose is not greatly affected by the temperature, but that of levulose diminishes as the temperature rises, so that invert sugar becomes practically inactive at about 86°.

Results of Examination. — Of the 203 samples of molasses and syrups examined for the Dairy Commissioner, 34 were adulterated with glucose syrup and 169 were free from this adulterant. The percentage of adulterated samples was 20.1. In the previous year it was 32.8. The numerous prosecutions brought by the Commissioner have probably lessened the introduction and sale of adulterated molasses in this State.

It is also noticeable that the proportion of glucose added in the adulterated samples is less than in the previous year. There are a considerable number of samples which, by direct polarization, show no higher polarization sugar than is found in some genuine molasses (50 to 60 per cent.). But polarization after inversion at room temperature and at 86° C. demonstrates the presence of an adulterant.

Maple Syrups.

Two samples, labeled "Maple Syrup," were examined for the Commissioner, and were found to contain no glucose.

Syrups.

Four samples, labeled "Syrup," "Crystal Syrup," or "Vanilla Drips," tested for the Commissioner, were found to consist largely of glucose syrup.

Cream.

A sample marked "Bryant's Pasteurized Cream," contained 47.25 per cent. of butter fat. A sample marked "Pure Cream, the Mount Philip Farm, Weatogue," contained 47.0 per cent. of butter fat. In neither sample was there found either borax or formaldelyde.

Butter and Oleomargarine.

Seventeen samples have been examined for the Dairy Commissioner during the year ending July 31, 1897.

Methods of Examination.

Specific Gravity. — This is determined at the temperature of boiling water by means of Westphal's balance, as first described by Estcourt and by J. Bell, Chem. News, Vols. xxxiv, 254, and xxxviii, 267.

The balance is so adjusted that water at 15.5° C. shall represent unity.

With distilled water, at the temperature of boiling, the instrument indicates a specific gravity of .9625. If the specific gravity of fat at the temperature of boiling water is desired, using the weight of an equal volume of distilled water, *at that temperature* as a standard, the reading of the instrument must be multiplied by 1.039.

We have also used for this determination a specific gravity spindle made by Greiner of New York City, $6\frac{8}{8}$ inches long, reading from .8550–.8700, and graduated to show differences of .0005 in sp. gr.

Volatile Fatty Acids. — These were determined by the Reichert method, the saponification being effected by the method of Leffmann and Beam, as described in the Analyst, xvi, 1891, p. 153. The result of the determination is expressed by the number of cubic centimeters of $\frac{1}{10}$ normal sodium hydroxide solution necessary to neutralize the acid distilled from 2.5 grams of the fat.

Results of Examination.

Of the samples examined, 10 were butter and 7 were imitation butter, or oleomargarine.

The specific gravity of the melted fat, determined by the method above named, in a single sample of pure butter, was 0.8649; in the samples of imitation butter, or oleomargarine, it ranged from .08596 to 0.8062.

The volatile fatty acids determined as above described, in 2.5 grams of butter-fat, ranged from 13.50 cc. to 16.50 cc. In the like quantity of imitation butter they ranged from 0.13 to 0.70.

SUMMARY.

The following table contains a summary of the results of the work done during the past year in the examination of food products :

	No. of samples not found to be adulterated.	No. of samples found to be adulterated.	No. of samples containing borax or salicylic acid, not otherwise adulterated.	Total.
Collected by the Station —				
Purchased in Connecticut Market :				
Jellies,	27	43	..	70
Preserves, Jams, Marmalades, etc.,	6	45	..	51
Teas,	89	..	..	89
Coffee,	34	11	..	45
Coffee Compounds,	22	..	..	22
Coffee Substitutes,	6	..	..	6
Flour,	25	..	..	25
Ginger,	67	24	..	91
Malt Liquors,	35	..	12	47
Sausage,	5	..	14	19
Honey,	27	10	..	37
Maple Syrup,	3	..	..	3
Milk,	13	..	..	13
Cream,	19	..	4	23
Canned Soups,	32	..	..	32
Canned Vegetables,	65	..	..	65
Chili Sauce,	..	1	..	1
Mince Meat,	9	..	..	9
Ground Spices in labeled packages,	142	28	..	170
	626	162	30	818
Purchased from Importers :				
Pure Spices, Spice By-products, etc.,	125	...	..	125
Total collected by the Station,	751	162	30	943
Collected by the Dairy Commissioner :				
Vinegar,	20	12	..	32
Molasses,	169	34	..	203
Syrups,	4	..	..	4
Cream,	2	..	..	2
Butter,	10	7	..	17
Total collected by Dairy Commis'r,	205	53	0	258
Sent by Individuals :				
Milk,	96	..	..	96
Cream,	9	..	..	9
Total from all sources,	1,061	215	30	1,306

SOME COMMON DISEASES OF MELONS.

By Wm. C. Sturgis.

For several years the growing of melons in southern Connecticut has been attended with discouraging results, sometimes amounting to complete failure. Before striking off melons from the list of plants which can be grown with profit, it is well to consider the causes which have led to failure, and to attempt the application of remedial measures.

In common with most members of its family, the melon is a plant of rank growth and succulent, delicate tissues. The fruit contains about eighty-four per cent. of water, and the leaves and stems when dried under pressure show, by their extreme thinness, that they also contain a very high percentage of water when fresh. For its full development, the plant requires a light, warm soil, and it thrives best under conditions of high temperature, dry air, and continuous sunshine. The melon plant is as delicate in constitution as in texture. It does not adapt itself readily to varying conditions or sudden climatic changes, its physiological balance is easily upset, while its tissues offer little resistance to the attacks of insects, fungi, and bacteria.

I

At least three different causes are accountable for the recent failures of the melon crop. The first and most important is unquestionably a bacterial disease which has been very accurately studied and described by Dr. E. F. Smith of the United States Department of Agriculture. Unfortunately, we have as yet no extended account, in English, of Dr. Smith's investigations, but the disease itself is doubtless familiar to all melon-growers. It is characterized by a sudden wilting of the leaves, which is quite independent of atmospheric conditions, being as liable to occur in cloudy as in clear weather. As far as my experience goes, a plant thus wilted never recovers as do plants which droop from the effects of sudden sunshine after cloudy weather. Usually only a single plant

in a hill shows the disease; occasionally all the plants in a hill will be smitten at once; but, in any case, a plant once attacked is doomed; the leaves wilt down and wither completely, while the stem either dries or becomes food for eel-worms, putrefactive bacteria and other agents of decay. It sometimes happens that where a vine branches near the ground, one branch may be attacked and the rest of the vine remain healthy; if, in such a case, the diseased branch is cut off at its junction with the main stem, the rest of the vine may escape infection. I have noted several cases during the past summer in which a vine was saved by the removal of a diseased branch before the infection had reached the main stem.

The specific cause of this disease, Dr. Smith describes as a rod-shaped, ciliated, motile bacillus (a name applied to a certain genus of bacteria), isolated or united in pairs and occuring in the vessels of the leaf-ribs and stem, from the cut ends of which it oozes in slimy, milk-white drops. It grows readily in pure cultures on a number of the usual culture media, such as beef-broth, potato decoction, boiled potato, etc. It requires the presence of free oxygen and an alkaline medium for its best development; it is extremely sensitive to heat, a temperature of 43° C. (108° F.), maintained for ten minutes, being sufficient to destroy it, and, while very sensitive to desiccation, it may live for months if kept moist.

By isolating this bacillus in pure cultures and inoculating melons and cucumbers with it, as well as by transferring it directly from diseased to healthy plants, Dr. Smith proved conclusively that the organism in question is the specific cause of the disease, and that it is probably identical with a similar organism attacking squashes. According to Dr. Smith's published researches, the immediate cause of the death of melon plants invaded by this bacillus is not the destruction of tissues, but the choking of the vessels by its accumulation within them and the consequent arrest of water-supply to the leaves. The plants become infected through the leaves, probably by the agency of insects such as the striped cucumber-beetle (*Diabrotica vittata*) and the squash-bug (*Coreus tristis*).

When the infected leaf wilts, the bacillus has already traversed its vessels and reached the stalk; here it multiplies, at first in the spiral vessels only, but later in the large dotted ducts, choking them up more or less. At first there is no destruction of the tissues, the diseased stem appearing quite nor-

mal, but later the walls of the vessels are destroyed and large cavities are formed, filled with the bacillus. Owing to the predilection shown by this organism for the *tracheae* or vessels of the stem, it has been named by Dr. Smith *Bacillus tracheiphilus*.

That this is actually the disease which, for the past five years at least, has destroyed a large percentage of the melon vines in Southern Connecticut there can be no doubt. Continuous observation in the field, in three separate localities, during the past season, convinced me that the chief source of trouble was the bacterial organism above mentioned. A plant wilts suddenly, without apparent cause; from cut stems of wilted plants kept under a bell-jar in the laboratory, viscid, milky drops ooze out, swarming with motile bacilli, apparently identical with those described by Dr. Smith; microscopic examination of diseased stems shows that the large vessels (water-channels) of the wooden portion are almost filled with yellowish masses of the same organism, while the petioles of squash leaves inoculated with a small portion of one of the viscid drops from a diseased melon stem show the characteristic symptoms of the disease in the course of five days.

One other point, however, is worthy of mention. In examining a vine from which a wilted branch had been removed a few days previously, it was seen that the main stalk at the cut was covered with a dense whitish mold, and that the whole plant had begun to droop. It was thereupon pulled up and further search brought to light another wilted plant, the base of which was likewise covered with white mold. This plant was also removed and both were microscopically examined the following day. The mold proved to be a species of *Fusarium*, the vegetative portion of which had permeated the stalk; where the latter was broken and the tissues were exposed, the fungus had fruited, producing vast numbers of pointed, cylindrical, slightly curved, 3-5-septate spores, measuring 30-54 $\times$4.5-5.7 μ. The two stalks were divided longitudinally and placed in a moist atmosphere under a bell-jar. In twenty-four hours they were examined again and the mycelium of the *Fusarium* was found to have given rise to masses of minute elliptical bodies, non-septate, and measuring 8.5$\times$3.8 μ. The genus *Fusarium* includes a number of so-called species, most of which occur on dead vegetable matter, though a few are

known to infest living plants. The mere fact that a member of the genus occurs in the tissues of the crown of melon plants would not be worth mentioning were it not that more than one disease of plants, characterized at first by wilting, has been traced directly to the accumulation in the water-passages at the crown, of the mycelium and spores of a *Fusarium*. Such a disease in cotton has been described by Atkinson, and in tomatoes by Massee. In the Twenty-first Annual Report of this Station (1897), I described a disease of carnations apparently due to the same cause. Furthermore, Smith describes* a disease of watermelons in the South as caused by a fungus which gains access to the plant through the roots, appears abundantly at the crown, produces on the surface of the stem "large lunulate, 3-5-septate conidia (50 μ long)," and, in the internal tissues of the stem, produces " minute, elliptical, colorless conidia (10 μ long) . . . on white mycelium which plugs the water ducts," and thus causes the plants to wilt and finally die. The resemblance between this fungus, which Dr. Smith has named provisionally *Fusarium niveum*, and the one found by me in wilted muskmelon plants, as well as the similarity, in appearance, of plants infested by them, warrants the suspicion that the wilt-disease which has been so prevalent lately in our muskmelon fields may be due in part to the attacks of a species of *Fusarium*, possibly the same as that associated with the wilt of watermelons.

II

The second disease which, in former years, has caused serious injury to muskmelons, is a black mold occurring in circular patches upon the leaves, and known as *Alternaria Brassicae, var. nigrescens*. This fungus was noted and its effects described in our Nineteenth Annual Report (1895.)

III

The third trouble is entirely different from either of those described above. When cool, cloudy weather alternates with hot sunshine it is frequently noticed that the large leaves near the center of the hills turn yellow at their margins. Later, these yellowed margins become brown and dry, and finally the whole leaf is diseased. As the leaves die down they begin to

* Proc. Am. Asso. Adv. Sc., XLIII, p. 289; and XLIV, p. 190.

decay, the tissues become infested with eel-worms, putrefactive bacteria and molds of various kinds, and sometimes the whole plant is ruined. In this case the initial injury is due to a derangement of the proper activities of the plant. I have frequently had occasion to mention the dangers to plant-life of sudden atmospheric changes, especially from damp, cloudy weather and low temperature, to a dry, hot air. When both the soil and the atmosphere are surcharged with moisture, evaporation takes place very slowly from the leaves, and is abundantly compensated for even by the lessened absorptive activity of the roots due to the low temperature of the soil. If now the plants are suddenly exposed to a hot sun, evaporation from the leaves becomes very active, while the roots are unable to respond to the sudden demand made upon them, since the soil temperature changes but slowly. Consequently the leaves give off water more rapidly than they receive it, the cells tend to collapse and, if the equilibrium is not speedily restored either by increasing the absorptive activity of the roots through warming the soil, or by decreasing the evaporative activity of the leaves through shading or sprinkling, the leaf tissues will die. Such a condition is, of course, much more liable to occur in the case of plants, like the melon, which absorb water with avidity and retain a very large quantity of it in their delicate tissues, than in plants with denser tissues requiring and retaining less water.

There are, then, three distinct troubles to which are to be ascribed the recent losses in our melon-fields: — First, a Wilt caused by the bacterial organism *Bacillus tracheiphilus*, and possibly also by a fungus of the genus *Fusarium*; secondly, a blight of the leaves occasioned by a variety of the fungus *Alternaria Brassicæ*; and thirdly, Leaf-Burn, a physiological trouble that follows sudden disturbance of equilibrium between water-absorption and evaporation.

With the view of obtaining further information regarding the possible control of these troubles, three experiments were conducted during the past summer in different localities and on different soils, viz. at Saugatuck, in Fairfield county, and at New Haven and North Haven, in New Haven county. At Saugatuck the melons occupied a rather low piece of ground and a fine, dark, loamy soil, not particularly favorable for melons except in a very dry season. Ten rows were selected, each containing sixteen hills. Ten hills in each row

were treated with fungicides, the remaining six serving as checks. Three rows received Bordeaux mixture, three potassium sulphide, one sulphur, and three "Laurel Green," a "combined fungicide and insecticide" prepared by the Nichols Chemical Company, Syracuse, N. Y., and containing ten per cent. of copper and seven and three-quarters per cent. of arsenic.* The melons at North Haven occupied an ideal soil for melons, warm, sandy, and deep. A plot was selected comprising twelve rows, with twelve hills in each row. Six hills in each row received fungicidal treatment, the remainder served as checks. Besides this treatment, one-half of the hills in each plot were mulched heavily with tobacco stems in order, if possible, to prevent the inroads of melon-lice, and to guard the roots from sudden changes of temperature. The fungicides applied to these plots were the same as those used at Saugatuck. The melons at New Haven were on a dry, rather gravelly soil, and served only to test the effects of a heavy mulch of marsh hay, about two-thirds of the field being mulched in this manner.

From these three experiments it was thought probable that there would be obtained some definite information as to the efficacy of root protection and the application of fungicides in preventing disease. In case the treated and untreated plants alike should show no sign of disease, the experiments would still serve to show the effect of fungicides on the delicate foliage of the vines.

The effect of mulching, as seen in the field of Mr. A. N. Farnham of New Haven, where marsh hay was used, and at Mr. H. P. Smith's of North Haven, where tobacco stems served a like purpose, was not particularly striking. At Mr. Farnham's the mulch checked the growth of weeds and protected the melons from the dirt, but all of the vines, whether mulched or not, showed extraordinary vigor, and it is very doubtful whether mulching with hay will, in ordinary seasons, prove remunerative. In periods of severe and protracted drought it would undoubtedly be of value in conserving the soil moisture until the same result was attained by the growth of the vines themselves.

As to the value of tobacco-stem mulch, the experiment at North Haven presented some interesting facts, although,

* See Cornell Univ. Agr. Exp. Sta., Bull. 149, p. 720. 1898.

owing to the entire absence of plant-lice, nothing was learned regarding its efficacy in protecting the vines from those insects. Merely as a covering for the soil, tobacco seemed to be of even less value than marsh hay, and is, of course, much more costly. Weeds throve with peculiar luxuriance where the tobacco was used. But, as a source of plant-food, the value of the tobacco became more and more apparent as the fruiting season approached. The whole field had received a liberal application of fertilizer* before the seed was planted, and this proved sufficient to maintain the vigor of the vines until the fruit was about half grown. On August 13th a visit was paid to the field and the appearance of the vines left nothing to be desired. The leaves were of a rich green color, indicative of perfect health, the vines completely covered the ground, and the fruit was setting in great abundance and growing very rapidly. Nine days later the whole field had a yellowish tone, and closer inspection of the vines showed that they were evidently suffering from lack of food. The larger leaves, especially those near the center of the hills, were of a pale green color, very different in tone from that which had characterized them nine days previously. Moreover, on these leaves were beginning to appear the circular brown spots marked with darker concentric rings which indicate the presence of the *Alternaria*. Only on the plots mulched with tobacco did the vines show their former vigor. These facts can only be explained on the theory of an insufficient, or rather, an ill-regulated supply of plant-food. As I have said, the fertilizer for the whole season was applied at the same time and before the seed was planted. Had the season been a dry one, or had the rainfall been evenly distributed throughout the summer, or had the soil been less liable to leach, this original supply of plant-food would doubtless have been sufficient to carry the vines through. But the actual conditions were quite the reverse of this. The fertilizer was applied on May 9th and at the time of planting; the seed was planted between May 14th and 23rd. The month of May was very rainy, heavy rains occurring on sixteen of the thirty-one days. Then followed a long period of great

* Canada wood ashes was applied broadcast, at the rate of half a ton to the acre, a week before the seed was planted, and, at the time of planting, each hill received a fork-full of compost consisting of three parts of barnyard manure and one part of tobacco-stems.

drought, beginning on May 28th and continuing, practically without intermission, except for three light showers, until July 4th. During July there were seven days of rain, and the month of August was characterized by a succession of very heavy thunder storms which did great damage on loose soils. Under these circumstances melon vines grew rapidly during June and made large demands on the fertility of the soil. These demands were increased when the fruit began to form, while simultaneously the heavy downpours of August, falling upon the loose, sandy soil, washed much of the remaining fertilizer down beyond the reach of the roots and thus decreased the already limited supply of plant-food. These conditions were aggravated by the facts that too many vines had been allowed to a hill and that the set of fruit was enormous. Four vines occupied each hill, and on August 22nd I counted as many as thirteen almost full-grown melons in one hill. To form this amount of fruit there must have been a demand upon the soil which, under the circumstances, it could not supply, and the vines began to show signs of starvation. Just here the value of the tobacco mulch began to be apparent. Soaked by the rains and undergoing a natural process of decay, the tobacco stems readily gave up to the soil all of their soluble constituents, which proved sufficient to carry the vines through. A similar effect was seen in the melon patch at Saugatuck. A case of tobacco stems had been left over from an experiment of the preceding year, and Mr. Wakeman, the owner of the field, having no other use for them, applied them liberally to twenty hills, early in July. The soil was closer and less liable to leach than the North Haven soil, so that the vines in general showed no evidence of starvation; nevertheless, those which were supplied with tobacco stems were plainly more vigorous and retained their vigor longer than any others in the field.

I am not prepared to recommend tobacco stems either as a mulch or as a fertilizer for melons, since the cost would be prohibitive, but I think that the facts above stated justify the following conclusion:

When melons are grown upon a loose, sandy soil, which is liable to leach, it is advisable to apply the fertilizer in small amounts and at intervals throughout the season, or until the spread of the vines makes tillage no longer practicable, rather than to make a single application of a large amount at the beginning of the season. The former method will be found to be of special advantage in a season characterized by repeated and heavy rains, and if more than two vines are grown in one hill.

As to the effect of fungicides upon the diseases of melons, the experiments are rather inconclusive. They were designed to test the resistance of the foliage and to protect the latter from the *Alternaria*. The fungus, however, failed to appear at all on the vines at Saugatuck, and at North Haven it appeared first about the middle of August, when the vines were in a half-starved condition. Whether it would have appeared at all if the vines had been in better general health is an open question, though the hills mulched with tobacco certainly showed less of the trouble than did the others.

Of the four fungicides used — Bordeaux mixture, potassium sulphide, sulphur, and Laurel green — sulphur was the only one which injured the foliage seriously. This was the third season that I had used this fungicide on melons, having conceived great hopes of it from its well-known efficacy in checking the mildew of so tender-leaved a plant as the rose, and from the excellent results which had attended its use on celery on various occasions. In 1896 I recommended it for melons on the farm of the Messrs. Meeker of Westport, and Mr. Meeker reported that it burned the plants. In 1897 I used it myself in an experiment with melons at Mr. S. B. Wakeman's at Saugatuck, and, although I noted that the vines on which it was used showed evidences of severe blighting or burning, I was not prepared to lay the whole blame upon the sulphur, since all of the vines were practically ruined by excessive rains before the fruiting season. The experiments of the past summer, however, leave no further room for doubt. At North Haven the first application was made on July 6th; at Saugatuck, on July 7th. These were repeated on July 15th and 16th respectively. On the 22nd and 23rd the vines were so badly burned that the treatment with sulphur was discontinued. At North Haven no further applications were made to these vines and later one of the rows recovered partially, but the other two were irretrievably ruined. At Saugatuck, where the injury was not so serious, potassium sulphide was substituted for the sulphur and the vines recovered their vigor in a measure.

The application of sulphur to the leaves of melons is not to be recommended. Although valuable as a fungicide, it has a decided tendency to burn the leaves.

The Bordeaux mixture used in both experiments was made

according to the 6-4-50 formula and was applied four times at North Haven—July 6th, 15th, and 22nd, and August 2nd. At Saugatuck the melons were less advanced, and five applications were made—July 7th, 16th, and 23rd, and August 3rd, and 16th. The potassium sulphide was used in the proportion of two ounces to five gallons of water, and the Laurel green in the proportion of one pound to ten gallons. All of these were applied on the same dates. No injury of any kind resulted from the use of either the potassium sulphide or the Laurel green, but the vines sprayed with the Bordeaux mixture of full strength showed indications, after the third treatment, that the mixture was too strong; for the subsequent treatments it was made up on the 5-5-50 formula and diluted, before use, to half that strength. (See p. 266.) This proved perfectly satisfactory.

Bordeaux mixture (containing not more than three pounds of copper sulphate to fifty gallons of water), Potassium sulphide, and Laurel green are safe fungicides for use upon melon vines.

As to the efficacy of these fungicides in protecting the vines from fungous attack but little can be said. The only disease which affected them very seriously was the bacterial wilt. This appeared shortly after the runners began to grow rapidly, and continued throughout the season. It is worthy of note that at no time were any predaceous insects found in connection with this bacterial disease, although, taking the check rows as a fair sample of the field, the disease at North Haven destroyed almost thirteen per cent. of the vines, and at Saugatuck almost three per cent. At each spraying the vines were carefully examined and those showing the wilt wholly or in part were immediately pulled up and removed from the field.

The following is the record of this operation:

	Number of Wilted Plants.	
	At North Haven.	At Saugatuck.
In Bordeaux rows,	3.	3.
Check,	5.	0.
In Potassium sulphide rows,	8.	1.
Check,	4.	4.
In Sulphur rows,	?	2.
Check,	10.	0.
In Laurel green rows,	15.	2.
Check,	9.	1.

It is evident that no conclusion can be drawn from these figures, unless it be that fungicides are useless in combatting the bacterial wilt of melons. If this be so, it is only in line with what we know of the bacterial diseases of other plants. They do not readily succumb to fungicides.

It is probable that the susceptibility of melons to contract the bacterial wilt is unaffected by the fungicides commonly used against fungous diseases. Removing and destroying all wilted vines is the only practical method of preventing the spread of the disease.

Observations on the spread, at North Haven, of the leaf disease caused by the fungus *Alternaria Brassicae* were convincing as to the efficacy of both Bordeaux mixture and potassium sulphide as preventives. The vines sprayed with each of these fungicides remained absolutely free from the *Alternaria*, while the characteristic brown blotches of the fungus made their first appearance, about the middle of August, on all of the corresponding check rows and increased in number throughout the fruiting season, damaging the vines to a considerable extent. It was noticeable, however, that the fungus appeared simultaneously with the first indications of the starved condition of the vines, none of the check rows, owing to an oversight, having received the tobacco mulch. This fact, coupled with the equally significant absence of the disease on the Saugatuck melons which at no time showed any sign of a lack of plant-food, would seem to indicate that the *Alternaria* attacks only vines which have been weakened by other causes.

Dilute Bordeaux mixture and Potassium sulphide may both be regarded as efficient preventives of the blotching of melon-leaves by the fungus *Alternaria Brassicæ, var. nigrescens*. There are decided indications that vines thoroughly nourished and otherwise well cared for will not ordinarily suffer from this trouble.

As to the value of Laurel green, the results at North Haven are unfavorable. The rows sprayed with it began to be blotched at the same time and to about the same degree as the check rows. The Laurel green used was too coarse to remain in suspension even as well as Paris green. Only while vigorously stirred could the mixture be evenly distributed. This is an objection to its use in a spray, no matter how effective it might prove when suitably applied.

MILDEW OF LIMA BEANS.

By Wm. C. Sturgis.

In the Annual Report of this Station for 1897, p. 165, occurs the following statement: "Much can be done by the grower, apart from the application of fungicides, to lessen the susceptibility of lima beans to mildew. The selection of well-drained land and a light soil is important, but, above all, care must be taken, by reducing the number of vines in a hill and by planting the poles erect, to insure conditions as little favorable as possible to fungous disease." With the co-operation of Mr. S. B. Smith of East Haven, upon whose land the spraying experiment of last year was conducted, it was planned to test the difference between thick planting and thin planting, and between upright poles and slanting poles, as regards the prevalence of mildew. Four rows, each comprising thirty-six hills, were selected near the center of a large field of beans. On the first row the poles were set upright; on the second they were set slanting in pairs, so that the tips of the poles in each pair were together, on the third upright and on the fourth slanting. The first three rows were divided into sections of six hills each, and after the beans were well started above ground each hill was either thinned out or increased by transplanting, so that, beginning in the first section with one plant to a hill, the hills in each succeeding section contained one more plant than those of the preceding one. Thus the crop from the three rows would show the comparative results, as regards the yield, of having from one to six plants to the hill; and also any advantage, as regards the prevalence of mildew, which might accrue from planting thinly and preventing the excessive crowding of the vines at the tops of the poles. The fourth row was included merely as a check. It was set, according to the usual custom, with slanting poles, and the hills throughout contained an average of two or three plants. No spraying was done during the course of the experiment, since the latter had in view solely the connection between the prevalence of mildew and certain methods of culture, and it was therefore undesirable to check the possible spread of the mildew by the use of Bordeaux mixture, as was done last year. A similar experiment, though on a much smaller scale, was conducted on the Station grounds.

During the winter much time and labor had been expended in the endeavor to unravel the question as to how and where the mildew succeeded in passing the winter. With this end in view a quantity of pods and portions of vines completely covered with the fungus had been gathered the previous autumn and placed out of doors where they would be exposed to the weather without being disturbed. Eight months later this refuse was brought into the laboratory and examined with the utmost care for resting-spores, a perennial mycelium, or any other form in which the fungus might have been perpetuated. Through the kindness of Mr. A. N. Farnham of Westville, I also secured a large quantity of refuse from a mildewed crop of beans which had lain in the field all winter, and this was carefully examined. In neither case was there found any trace of a vegetative or reproductive body which could be even remotely associated with the *Phytophthora* causing the mildew. The old pods were a veritable fungus-garden, but all of the species observed were common saprophytes such as species of *Fusarium, Alternaria, Macrosporium,* and the like.

Failing in this search and yet feeling sure that somewhere in that mass of refuse there must at least be the living mycelium of the *Phytophthora* awaiting only a favorable opportunity to become again active, this refuse was used as a mulch for the beans which had been planted at the Station. It was spread thickly upon the ground before the beans had started, and the latter were allowed to come up directly through it.

Finally, from the pods contained among this refuse, I succeeded in collecting a score or so of fairly sound beans which were planted in a separate row with the hope that one or two might germinate, notwithstanding the winter's exposure, and throw some light on the source of infection. It seemed reasonable to suppose that if the mildew passed the winter in a dormant condition in the beans themselves, then the plants produced from such beans would inevitably become mildewed early, providing that the weather were favorable to the development of the fungus, while if the latter were dormant in the old pods and vines, the forcing of young plants to grow up through a mulch of such refuse would certainly result in an early and disastrous attack.

That everything conspired to favor such an attack during the past season, was evident from the great damage which was caused by the mildew on the Smith farm at East Haven. The

fungus made its appearance there on August 5th, and by the 26th of that month over fifty per cent. of the pods were destroyed and there were no prospects of any further development of pods. The beans were on rather low, moist ground, and the weather during August was, on the whole, damp, close and sultry. Notwithstanding this, hardly a trace of the mildew appeared on the vines at the Station. Many of the beans were destroyed by field mice shortly after being planted, but a fair stand was secured; the vines grew well and produced perfectly sound pods until almost the close of the season, when some mildew appeared. The mulch of refuse from a mildewed crop had practically no effect on the vines which grew up through it, a fact which would indicate that such refuse remaining on the field is not, as would naturally be supposed, a menace to the crop of the next season. Of the beans collected from the refuse, only one germinated, but that one produced a vigorous, thrifty vine which bore a full crop of perfectly sound pods. Apparently, then, the propagative power of the mildew does not reside in the diseased seed. No clue was obtained from these experiments as to the important question of how and where the mildew is propagated from one season to another. The latest researches along this line, in connection with the related potato mildew, *Phytophthora infestans*, prove conclusively that that fungus passes the winter in the stored tubers, in the form of mycelium,* and analogy would lead one to suppose that in the same way the bean-mildew remains dormant in the diseased vines, pods, or seeds. As has been seen, however, neither observation nor experiment have thus far given any indication that such is the case.

The extensive experiment at East Haven was designed to test the comparative effect upon the prevalence of mildew and upon the total yield, of close and open planting and of upright and slanting poles. The results are of interest, but are not wholly conclusive. As regards the total yield, it was very seriously diminished by the mildew and this diminution was not proportional to the varying number of plants to a hill, for the reason that the sections containing the smallest number of plants were on the lowest ground and were first and most seriously attacked by the mildew. The crop on these sections, therefore, was proportionately less than it

* Ludwig Hecke, in Journal für Landwirthschaft, XLVI, pp. 71–74 and 97–142. 1898.

would have been if the only factor concerned had been the smaller number of vines to a hill. Moreover, on the upper sections where the hills each bore five or six plants, it was impossible to bring so many plants to maturity, since three or four were always more vigorous than the rest and consequently survived, while the weaker ones were dwarfed and often produced no fruit whatever. It appears safe to assert that it will not pay to attempt to grow more than four and probably three lima-bean plants to a hill.

Bearing these facts in mind we will consider the records of the various plots. Gatherings were made on August 5th, 12th, 20th, and 26th, and September 1st. At each gathering all of the marketable pods were picked and a record kept of the total number of pods and the number mildewed. At the final picking, on September 1st, all of the pods two inches or more in length were gathered, as the mildew had infested the fruiting tips of the vines to such an extent that there was no prospect of a further development of pods. The following record, therefore, represents very accurately the total yield of the vines and the percentage of mildewed pods for the whole season, on the experimental rows:

ROW A — POLES UPRIGHT.

Number of vines to a hill,	6	5	4	3	2	1
Total number of pods,	478	595	639	631	528	417
Number of mildewed pods,	236	228	332	315	192	248
Percentage of mildewed pods,	49%	38%	52%	50%	36%	59%

ROW B — POLES SLANTING.

Number of vines to a hill,	6	5	4	3	2	1
Total number of pods,	540	445	390	494	478	453
Number of mildewed pods,	267	211	193	227	253	218
Percentage of mildewed pods,	49%	47%	49%	46%	53%	48%

ROW C — POLES UPRIGHT.

Number of vines to a hill, .	6	5	4	3	2	1
Total number of pods, . .	624	564	567	632	350	275
Number of mildewed pods, .	308	361	289	299	168	124
Percentage of mildewed pods, .	49%	64%	50%	47%	48%	45%

A glance at these tables shows that in this instance the position of the poles has had no effect whatever upon the prevalence of the mildew. On the three sections planted with six vines to a hill, where we would naturally expect to find a decided difference owing to the excessive crowding of the growth at the top of the poles, no difference is apparent, while upon the section planted with a smaller number of vines the percentages of mildewed pods permit of no deductions regarding upright *vs.* slanting poles. The same is true in a measure regarding the effect, on the mildew, of thin *vs.* thick seeding. The highest percentage of mildew in row A occurs where only one plant was allowed to a hill. In row B it occurs where two plants were allowed, and in row C where five plants were allowed to grow in one hill.

The total yield was so seriously diminished by the mildew that no inferences can be drawn from the figures as to the comparative value, in this respect, of upright and slanting poles, but it is interesting to note, regarding thin *vs.* thick seeding, that increasing the number of vines in a hill does not increase the yield proportionately. In this respect two or three vines to a hill show as good a record as do five or six. In an ordinary season two vines to a hill would be an ample allowance. The past season was an extraordinary one in that the weather was exceptionally conducive to the spread of the mildew. The loss of over fifty per cent. of the pods and the practically complete destruction of the crop by September 1st, only four weeks after the first appearance of the mildew, shows the severity of the attack, and it is very probable that under such conditions no merely cultural methods would ever suffice to prevent or even to lessen the destructiveness of the fungus. One other fact served in a measure to vitiate the results. As stated above, the field where the beans were grown sloped downward slightly from north to south. A marshy piece of land adjoins the field on the south,

and in rainy weather the soil is so wet at that end that it is difficult to secure a stand of beans. The experimental rows ran north and south so that the soil at the lower end of every row was decidedly more moist than that at the upper end. This had a marked influence on the mildew, causing it to appear earlier and with more severity on the more thinly seeded sections where it was expected to be less severe. That this caused an exceptionally high percentage of mildew on these sections and therefore tended necessarily to lead to erroneous conclusions regarding the value of thin seeding is shown by the record of row D, which was a normal field row, set, as usual, with slanting poles and bearing an average of two or three plants to a hill. This row yielded, on August 12th, a total of 305 pods, of which nineteen, or six per cent., were mildewed; the mildewed pods occurred only on the lowest six hills. On August 20th the lower half of this row yielded 287 pods, of which forty-four per cent. were mildewed, while the upper half yielded 272 pods, of which only twelve per cent. were mildewed. Later, when the mildew was at its height, there was no appreciable difference between the upper and lower portions of this row, but it is very evident that the wetness of the soil in the lower portion of the field exercised an important influence upon the inception and spread of the trouble. If this had been foreseen the experimental rows would have been run east and west and we should have looked for a marked advantage from thin seeding, an advantage which, under the circumstances, was offset by the more favorable conditions existing for the spread of the mildew where thin seeding was tried.

I am confident that the loose, dry soil upon which the beans were planted at the Experiment Station was the chief factor in preventing the appearance of the mildew until very late in the season. All other conditions were as favorable to it as on the Smith farm, and every means, short of direct infection, was used to induce an attack. It would be useless to attempt to draw any conclusions from these experiments.

They serve, however, to emphasize the importance of selecting high, well-drained land for the culture of lima beans, and they indicate that a wet soil tends to induce the spread of the mildew in a degree which no cultural methods will wholly counteract.

PRELIMINARY NOTES ON TWO DISEASES OF TOBACCO.

By Wm. C. Sturgis.

For the last three years my attention has been repeatedly called to a peculiar disease of growing tobacco, and I have been urged to investigate it with the view of ascertaining its cause. The pressure of other work and the distance of the Experiment Station from the principal tobacco regions of the State have prevented my giving to this matter the attention which it deserves, and the following notes are compiled largely from the published works of foreign investigators, supplemented by such information as I have been able to gather from the growers and from personal observation. In this connection I wish to express my indebtedness to Mr. W. K. Ackley of East Hartford for his valuable assistance in the way of supplying information and in affording every facility for a study of diseased tobacco in the field.

THE SO-CALLED "CALICO" OF TOBACCO.

This disease of tobacco is very common in certain seasons and in certain portions of the tobacco region about Hartford. It may make its first appearance either in the seed-bed or in the field. In the former case the young plants, when they are from one to six inches high, begin to show a mottled appearance of the leaves, at first visible only as an almost inperceptible pale green color of the tips of the leaves, but soon arresting attention by the spread of this pale color, in blotches, all over the leaf surface, the contrasting shades of green being very noticeable. Such plants are of course discarded when transplanting to the field is begun; nevertheless, the same disease may appear later in the field, sometimes within a week of transplanting and sometimes not until after the plants have been topped and suckered. When a plant is attacked in the field it soon becomes a noticeable object, even from a distance. It is usually smaller than its neighbors, it does not present the healthy, dark green color of a sound plant, the leaves are narrow and are inclined to stand up stiffly, and on closer inspection the peculiar mottling of the leaves is very distinct. The pale color, first visible at the tips of the leaves, gradually

progresses downwards, following with more or less regularity the course of the veins. The paler tissues grow less rapidly than those of the darker portions, so that the mottled appearance becomes intensified by the thickening of the darker areas and the leaf surface presents a blistered appearance. Another characteristic of a diseased plant is the tendency of the leaves to curl downward at their margins, owing to the fact that the growth of the marginal tissues is checked. From this time on the plant is worthless and is generally removed. If allowed to remain, the paler portions of the mottled leaf lose their green color, and the whole leaf becomes yellow and sprinkled over, especially toward the tip, with small circular spots where the tissues are bleached, dead, and brittle. Sometimes the leaf, in the later stages of the disease, takes on a uniform reddish-brown color. The disease, in its progress, resembles a process of ripening in which every phase, from the first indistinct mottling characteristic of a fully ripe leaf, to the final brown color of the leaf when cured, is represented in an intensified form and a brief period of time.

What is recognized among experts as true calico makes its appearance early, in the seed-bed or the field; attacks, at first, the middle and lower leaves; spreads from them to the upper, younger leaves; and usually is at its worst before the time for topping. At that time, or when the flower buds begin to form, especially if a period of cold, damp and cloudy weather is followed by hot, clear weather, some plants in a field show what growers call "mottled-top." The topmost leaves of the plant become mottled, but this appearance is finer and less pronounced than in the case of true calico. The leaves show the same tendency to stand erect, but are very susceptible to hot sunshine, drooping under it so conspicuously that a "mottled-top" plant can be readily recognized at a distance of several rods. What the ultimate fate of such plants is I am unable to say from personal observation, but it is not regarded as serious, since the affected portion is removed when the plants are topped and it does not spread to the remainder of the plant. I am also assured by certain experts that, under favorable conditions, a "mottled-top" will recover, though from the nature of the case it is only by an oversight in topping that it is given an opportunity to do so. One more point regarding "mottled-top" is worthy of mention. Leaves affected in this manner are supposed to be tougher in

texture than sound leaves, and, as a matter of fact, a "mottled-top" leaf which has become wilted can be crumpled in the hand without injury; but this is evidently merely the toughness which characterizes any tissue which has become flaccid through the withdrawal of water, and cannot be considered as a symptom of disease.

From careful observation of plants affected with "calico" and with "mottled-top," I have been unable to escape the conclusion that they are merely two phases of one and the same trouble. When it affects the plants early, whether in the seed-bed or in the field, and attacks severely the larger middle and lower leaves, it is called "calico"; but when it appears later in the season and produces only mild symptoms in the younger, top leaves, it is called "mottled-top." I may add that many growers are inclined to accept this hypothesis.

We may now pass to a consideration of some of the conditions under which calico develops. That it occurs throughout the tobacco fields of Hartford county is an undoubted fact, but it is equally certain that it is far more serious in some localities than in others. Thus, on the western side of the Connecticut River calicoed plants are seldom if ever seen in the seed-beds, and they occur only sporadically in the field. I have never seen a field of tobacco really seriously affected with calico in that region. The suckers, it is true, often show calico, but that is a condition very commonly occurring everywhere. On the eastern side of the river, particularly in the townships of East Hartford and South Windsor, calico is a very serious trouble almost every year. I have seen fully ten per cent. of the plants destroyed by it in a single field, and the damage seldom falls below one per cent. It is of interest, therefore, to compare the conditions prevailing on the two sides of the river.

Soil. — On the west side the best tobacco fields consist of a loose, deep, sandy soil, easily worked and fairly retentive of water. As a rule these lands, before being brought under cultivation, were covered with a second growth of white birch after having been denuded of the original forests of white pine. The surface of the soil crusts over after a rain, but the soil itself is rather loose in texture and does not bake or pack, hence it acts as a good conductor of heat and its temperature becomes readily adjusted to that of the atmosphere. On the east side, particularly where calico prevails, the soil contains

a larger percentage of silt or clay, hence it is more retentive of water, absorbs and gives off heat much less rapidly, requires constant tillage and, after a rain, bakes hard. When packed and slightly moistened, its surface has a slimy feel and becomes quickly covered with a coating of green algae. The difference between these two soils, especially as regards their susceptibility to changes of temperature, is worthy of note. It should also be noted, however, that in some localities on the east side the soil approaches in character that of the west side, being lighter and sandy, and that, in the opinion of certain growers, these localities are quite as liable to produce calicoed tobacco as are the clay soils. Upon this point further information is most desirable.*

Variety of Tobacco. — Few plants are more profoundly influenced by the character of the soil in which they grow than is tobacco. As a rule a close, heavy soil is best adapted to a large, rather coarse tobacco, curing to a dark color, while a lighter soil is suited to varieties with a smaller leaf, thin and silky in texture and curing to a bright color. The differences between the soils on the east and west sides, therefore, have their counterpart in the varietal differences between the tobaccos raised. On the west side, Havana is grown exclusively; on the east, seed-leaf; and the prevailing theory is that these cannot be reversed with profit.

Method of Culture. — The construction and the sowing of the seed-beds, as well as the general methods of transplanting and growing the crop, are essentially the same on the two sides of the river, and call for no comment.

Manuring. — In this particular the custom prevailing on the one side differs materially from that on the other. On the east side, natural manures are used very largely; on the west side, fertilizer-chemicals form the staple, if not exclusive, supply of plant-food. Of course there are exceptions on both sides, and individual judgment has led to numerous experiments with fertilizers, but the usual custom is as above stated, although on the east side there is a growing tendency to supplement the liberal application of stable manure with the sulphates of potash and ammonia, dissolved bone-black, etc.

Selection of Seed. — Usually the large growers raise their

* Those interested in this matter should consult U. S. Dept. Agric., Div. of Soils, Bull. 11, entitled "Tobacco Soils of the United States."

own seed year after year. Where calico prevails, the custom is to raise and use seed from sound plants for a period of three years, and then to secure a supply from some neighboring grower. This custom is of course based upon the supposition that calico may be transmitted through the seed, a supposition which, as we shall see later, is erroneous.

These very brief notes are sufficient to show that the principal points of difference between the conditions under which tobacco is grown on the east side of the Connecticut River, where calico is abundant, and on the west side, where it is very seldom, if ever, a serious trouble, are three in number; first, a marked difference in the texture of the soil; secondly, a consequent difference in the variety of tobacco which can be profitably raised; and thirdly, a difference in the substances used as sources of plant-food. We may eliminate the second difference, since it is directly dependent upon the first and since it is no explanation of the cause of calico to say that seed-leaf is more susceptible than Havana.

The essential differences then, are found in the soil and in the fertilizers. Which of these, if either, is accountable for calico? Before attempting to answer this question it will be of interest to note the results of certain observations and investigations which we have made on calicoed tobacco. External injuries which, either as cause or symptom, are connected with a plant disease, may be due to the attacks of predaceous insects or of parasitic fungi, to the invasion of the tissues by bacteria, or to causes of a physiological nature whereby the normal functions of the plant become deranged and wilting, yellowing, or spotting of the foliage results. Repeated and careful microscopic examination of the tissues of calicoed tobacco-plants precludes the theory of insect-injury. Calicoed leaves are not only free from insects themselves, but they show no sign of punctures or other indications of insect-attack. The external tissue of the stalks also shows no injury attributable to insects. Occasionally there are found in the tissues of the roots a few nematodes or eel-worms, but they are as frequently found in the root-tissue of sound plants.

It may be said with an equal degree of certainty that calico is not due to fungi. In the last stages of the disease, when the affected leaves have become brown and spotted, the dead tissues are frequently invaded by molds, but the latter are only such as occur commonly on any dead vegetable

substance, and in the earlier stages of the disease there is no trace of any fungus upon or within the tissues of the leaf. Search has also been made in the tissues of the stem and root of calicoed plants for fungi which are known to invade the water passages of some plants and, by their rapid growth, prevent the upward passage of water, and thus produce a wilting of the plant, and finally its death. No such fungus has been found.

As to the presence of bacteria in the diseased tissues, I cannot speak with any certainty. Direct microscopic observation is not to be relied upon, since the contents of the cells are so dense that they would effectually mask the presence of bacteria, unless the latter were present in great abundance; this they certainly are not. The only sure method of determining the presence or absence of bacteria is by means of cultures from the diseased tissues, and this I have not yet attempted. If the disease is caused by bacteria it would seem strange that it is not apparently contagious. It sometimes happens that where the plants are set by machine, two plants are dropped in the same spot. In such cases I have myself seen, and experts tell me that it is a common occurrence, that one of the plants becomes calicoed while the other remains perfectly healthy. In re-setting calicoed plants there is no evidence to show that the fresh plant is at all more liable to become calicoed from having been set in the spot previously occupied by a diseased plant. Moreover, the fact that suckers from a perfectly sound plant are very liable to calico and that a plant or stub bearing calicoed suckers may have shown no sign of the trouble, militates against the theory of bacterial infection. Finally, if the disease is caused by bacteria there would be a strong probability that seed from a calicoed plant would have a tendency to reproduce the disease. This, however, does not seem to be the case, as the following experiment shows:

In the spring of 1897, wishing to follow the course of calico continuously in the field, I secured from the seed-beds of Mr. Ackley of East Hartford twenty seedlings showing calico and, from the same bed, twenty apparently healthy seedlings. These were brought to the Station and set in two parallel rows in the garden. They were set too close together, the soil was not adapted to tobacco, only a very small amount of fertilizer was added to it and the plants received very little attention in the way of tillage. With one exception, all of these forty

plants were badly calicoed within six weeks. The exception was one of the originally healthy plants. The calicoed plants were dwarfed and the trouble ran its course with great energy; nevertheless, most of the plants flowered and ripened an abundance of seed. This seed was gathered and, in the following spring, after being sprouted, was sown in flats in the green-house. Of the hundreds of seedlings thus raised not a single one showed a sign of calico in the flats. Thirty seedlings were transplanted and set in a row in the Station garden; the soil in this place had received a dressing of barnyard manure and ten of the plants were given in addition about two bushels of manure, ten more received a handful of mixed chemical fertilizer dropped in the bottom of each hole before setting the plants and the remaining ten were planted without any additional fertilizing. All of the plants, especially those provided with an abundance of plant-food, showed great vigor and remained perfectly healthy. Meantime, from the same lot of seedlings, a dozen were sent to Mr. Ackley, who set them in a warm corner near the barn where they received the drainage from the barnyard. These also failed to show any sign of calico and formed plants of extraordinary size and vigor. It would seem apparent, therefore, that calico is not communicable through the seed.

Although it is by no means proven that calico is not a bacterial disease, and although the evidence that it is not so is entirely inferential, yet the facts above noted certainly create an impression that we must look elsewhere than to bacterial infection for the cause of calico.

We have thus excluded from the list of possible causes the attacks of insects, whether above or below ground, and of parasitic fungi on or within the tissues of diseased plants; the case against bacteria is doubtful, and there remains only the question of some physiological disturbance. Such a disturbance may arise as the result of artificial injury whereby the normal functions of the plant are hindered or arrested, or it may be due to abnormal natural conditions producing a similar result. In the former case, if the leaves and stalk are normal and uninjured, attention is at once directed to the root.

The opinion is often expressed with regard to calico that it is due to an unnatural twisting of or injury to the roots of the seedling in the process of transplanting, or to setting the plant over a stone or other obstruction which prevents the normal

growth of the tap-root. It is evident, however, that this theory fails to explain the existence of calico in the seed-bed, and, furthermore, the examination of the root-systems of scores of calicoed plants in the field, and a comparison between them and those of sound plants, shows no essential differences except such as are correlated with the dwarfed habit and weakened vitality of the calicoed plant.

Secondly, disturbances in the functional activity of a plant due to abnormal natural causes may be connected either with the soil, including its texture, composition, and contents, whence the plant draws its food and water; or with the atmosphere from which the plant derives the carbon for building up its framework and into which it transpires the excess of water absorbed by the roots.

As to the soil and its composition, it is naturally and primarily considered as a vehicle of plant-food supply. In this connection, it will be remembered, we noted as one of the essential differences existing between soils upon which calico is common and those upon which it is comparatively rare, that the bulk of the plant-food is supplied in the former case by stable manure and in the latter by fertilizer chemicals. Are we justified in concluding that here at length we have found the essential factor in the prevalence of calico? There have not been a sufficient number of critical experiments along this line to form the basis for a trustworthy answer to this question, nevertheless there are facts which have a direct bearing upon it. That calico is not due to a lack of plant-food is to be inferred first from the fact that quite as much plant-food is applied to the soil in one case as in the other, and secondly from the fact that calicoed plants occur here and there, without regularity, among the sound plants in a field liberally and evenly supplied with a complete plant-food. An inadequate food-supply would hardly become apparent in this sporadic manner. Moreover, the opinion of experts in raising tobacco is directly opposed to the theory that stable manure is responsible for calico, and their opinion is that of intelligent, practical men, who have experimented along this very line with the view of checking the disease. It is more than doubtful if calico is due to a lack either of plant-food in general, or of any one in particular of the essential elements of plant-food,—nitrogen, potash, or phosphoric acid. The case is somewhat different as regards lime,

—a substance which, on certain soils, is necessary to the best plant-growth. Lime may act beneficially in a number of ways. Occasionally it may enter directly into the economy of the plant, but usually its value lies in its mechanical and chemical action upon soils containing a large percentage of clay, undecomposed vegetable matter, or zeolitic silicates. In the case of most clayey soils, it tends to bind the finest particles together, thus making the soil more porous; where vegetable matter abounds, this is decomposed and made available by lime; in the case of zeolitic silicates, lime unites with them and liberates potash, ammonia, and other valuable constituents of plant-food, which thus become available.

Acting on the presumption that on the close, clayey soil of the tobacco fields of East Hartford the application of lime might be followed by good results, one of the largest tobacco-growers in that neighborhood was advised to try it. In accordance with this advice, he applied last fall on a portion of his land two and a half barrels of slacked lime per acre, and supplemented it the following spring by an application, broadcasted and harrowed in just before setting, of a barrel and a half of lime. The experiment was rather roughly planned and conducted, and no exact record of the results was kept, but the experimenter reported that no appreciable benefit resulted so far as the prevalence of calico was concerned.* It is highly desirable that this experiment should be repeated under better conditions, but meanwhile we may presume that whatever benefit results from the use of lime will be due, more to its effect upon the texture of the soil, than to supplying an element of plant-food which in all probability is not deficient.

A consideration of the soil in its mechanical aspects bears a close relation to certain facts connected with atmospheric conditions and the effect of the latter upon plant-life. To this consideration the question of the cause of calico has now been narrowed down, if we except the possible theory of bacterial infection. We have frequently called attention to the fact that a period of hot sunshine following a period of cool, cloudy weather may have a very deleterious effect upon a plant by

* Since the above was written I have heard of one well-authenticated case in which a heavy application of lime to the clayey tobacco-land of East Hartford was followed by a very marked decrease in the amount of calico usually seen.

causing such rapid evaporation of water from the leaves that the roots are unable to supply the demand. The effect of such a disturbance of equilibrium will become apparent in a wilting of the plant and, if long continued or repeated, will cause a diminished rate of growth and possibly the death of certain tissues situated at a distance from the source of supply and nourished only by the fine terminations of the veins; such tissues are situated at the tips and edges of the leaves, hence the tips will show signs of a lack of water and the margins, checked in their growth, will tend to become incurved. These symptoms will be the more marked the more sudden and violent are the atmospheric changes. Moreover, a plant of rank growth and succulent tissues will be more seriously affected than one in which growth is slow. Finally, the effect will be more serious if the soil is fine and close in texture than if it is loose and porous, since in the former case it is more retentive of moisture and therefore a poorer conductor of heat. In such a soil, the roots, if once chilled and their absorptive capacity diminished, as happens when the weather is cool, damp and cloudy, recover that capacity only as rapidly as the soil-temperature approximates that of the atmosphere; consequently, a plant growing in such a soil might be irretrievably ruined by a sudden access of sunshine long before the roots, buried in the cold, non-conductive soil, could so far recover their capacity for absorbing water as to supply the suddenly increased demand on the part of the leaves.

So much by way of theory. What have we by way of facts in the case of calico?

First, the general appearance and behavior of calicoed plants bears the closest resemblance to that of plants affected by the conditions above described. No one could observe a calicoed tobacco-plant and compare its appearance with that of tomato-plants forced to active growth in the greenhouse and affected as described in the Annual Report of this Station for 1896, pp. 232-234, without concluding that the two diseases were attributable to very similar causes.

Secondly, the tobacco-plant, like the tomato, but in a still higher degree, is of extremely rank growth, while the value of the leaf depends largely upon the delicacy of the tissues composing it; hence the plant is intolerant of sudden atmospheric changes and becomes more so the more those characters which give it commercial value are emphasized.

Thirdly, the calico of tobacco is prevalent in a district characterized by a close soil of fine texture, which packs hard, retains moisture, and is a poor conductor of heat; it is less common on loose, porous soil devoid of clay.

Fourthly, the disease is sporadic in its nature, attacking one plant and leaving the next one untouched; this is only what might be expected when we consider the differences which are known to exist between individuals of the same species and growing under identical conditions, as regards susceptibility to external conditions. A damper spot in the soil, a slightly unfavorable position of the roots, the close proximity of a stronger plant, an exceptional delicacy of texture or of that intangible quality which we call physical constitution,— any or all of these causes might be sufficient to predispose a plant to calico while its neighbor remains perfectly healthy.

Fifthly, the fact that suckers from the butts of plants which have been cut, are disposed to calico, may possibly be correlated with the fact that these suckers are produced at a season characterized, in this climate, by sudden atmospheric changes, that they are composed of rapidly growing tissue and are directly exposed to the full force of the sun, and that the soil is no longer kept open and porous by means of tillage.

Sixthly, there is a vague impression, hardly amounting to a theory, on the part of many growers of tobacco, that the attacks of calico are not so severe in places where the plants are in a measure shaded by trees, as where they are fully exposed.

Lastly, a number of experts in tobacco have, irrespective of any theory of mine, expressed to me their decided conviction that serious outbreaks of calico occur only during periods of sudden and marked atmospheric changes.

SUMMARY.

1. The peculiar appearances known as "calico" and "mottled-top" of tobacco are probably symptoms of one and the same disease. The former may occur very early in the life of the plant, even in the seed-bed, and usually attacks first the older leaves; the latter occurs later, is less pronounced, and affects only the topmost leaves.

2. The disease occurs abundantly in some localities, notably on the close, clayey soils on the east side of the Connecticut river; sparingly in other localities, where the soil is open and porous.

3. The disease is not contagious. As to its infectiousness, no direct statement can as yet be made.

4. It is not caused by predaceous insects, nematodes, or parasitic fungi.

5. Bacteria have not been seen associated with the disease, but no critical method for their isolation or culture has been applied and therefore the question of their influence cannot at present be answered. The facts observed, however, are not favorable to the theory of bacterial infection.

6. The disease is not inherent in the seed. Seed from badly calicoed plants may produce perfectly sound plants and *vice versa*.

7. It seems probable that the disease is purely a physiological one, caused primarily by sudden changes of atmospheric conditions which disturb the normal balance between evaporation of water from the leaves and its absorption by the roots, and secondarily by soil-conditions which prevent the speedy restoration of that balance. This supposition is supported by numerous facts.

Preventive Measures. These must, of course, be regulated by the opinion which is formed as to the probable cause of the disease. If it is bacterial, the only means of eradicating it from the field is by pulling, removing from the field and burning, every plant showing the least sign of the disease. In case it arises primarily in the seed-bed, the latter must be removed to fresh, uncontaminated land. A still more effective precaution in the latter case, would be to remove the soil, to the depth of a foot, over the space to be occupied by the seed-bed, and to replace it with soil thoroughly sterilized by being baked on a bed of sheet-iron placed over a hot fire, in much the same way as the sand used in the making of concrete walks is treated. If, on the other hand, the disease is a physiological one, there are two lines along which experiments might be conducted with fair hopes of success; first, the addition to the soil of some substance which will render the soil more porous and more permeable to heat; secondly, the protection of the plants, at critical seasons, from a sudden access of sunshine. To accomplish the first-named purpose lime will probably be in many cases, the cheapest and most effective agent. The quantity necessary and the best time to apply it are matters which can be settled only by experiment. To accomplish the second object, it might be possible and practicable to adopt some such device as that used by tobacco-growers in Florida. It consists of long mats composed of slats fastened together with twine. Wires are stretched across the field at intervals and upon these the mats are spread. The slats have narrow spaces between them so that they allow of the passage of rain and sun-

light, while at the same time they screen the plants from the direct rays of the sun. It is said that tobacco grown under these conditions is exceedingly fine. We hope, another season, to investigate these matters thoroughly.

The So-Called "Spotting" of Tobacco.

If that can be called a disease which is characterized by symptoms such as tobacco-growers desire to see in moderation, which enhance the market value of the leaf and which can be induced artificially with profit, then the "spotting" of tobacco comes under this head. It is a peculiar disease, never very common, not confined to any one locality and not characteristic of any special soil. What its earliest stages are I am unable to say, inasmuch as it is impossible to predict when it will occur and therefore to be on the watch for its first appearance, and, furthermore, because it only becomes noticeable when well advanced. As I have seen it in the field and in specimens sent to the Station, it is signalized by the presence on the leaf of small circular spots. These usually occur in the greatest number at or near the tips of the leaves and, at first, are yellowish in color and somewhat irregular in outline. Later they take on a circular form and become marked off from the surrounding tissue by a narrow border of a darker color. The tissue within this border finally dies and becomes almost white, but, except in severe cases, it does not break away from the leaf. A leaf so affected looks as though it had been sprinkled over with some caustic substance which has killed the tissues without disintegrating them. It bears a close resemblance also to the "leaf-spot" caused on certain plants by the attacks of fungi. Sometimes the spotting is slight and the spots themselves are scattered evenly over the whole leaf-surface; in such cases buyers are willing to pay a higher price for the tobacco, spotted wrappers being in demand. The spot can be successfully imitated by spraying the ripening leaves with a caustic liquid, and, where this is well done, the tobacco also brings a higher price.

It is only when the spot invades practically the whole leaf and causes the breaking of the tissues that it does serious damage. I have repeatedly, but thus far unsuccessfully, attempted to discover the primary cause of this trouble both by consult-

ing the opinion of experienced tobacco-growers and by careful microscopic examination of the spots. Some say that it is due to particles of sand adhering to the leaves; others that it is caused by drops of water, which, acting as lenses, burn the leaf where they rest; but with regard to these theories it is sufficient to say that they have been put to proof in many attempts to produce the spot artificially, and have signally failed. Scores of the spots have been microscopically examined during the past three years without showing any evidence of the presence of fungi, insects, or bacteria. Nothing further, therefore, can be said regarding this trouble, nor would it have been considered worthy of mention at present were it not for its resemblance to a disease of tobacco which occurs in Europe and Asia.

Foreign Investigations upon Two Diseases of Tobacco.

In 1885 Dr. Adolf Mayer, Director of the Experiment Station at Wageningen, Holland, published an account of a disease of tobacco to which he gave the name "Mosaikkrankheit," or Mosaic Disease.* This disease is characterized as follows: In from three to five weeks after setting, there appears upon the leaf-surface of plants, otherwise healthy, a mottled coloration in shades of dark and light green. The tissues of the darker portions become thicker and grow much more rapidly than the paler portions, so that an irregular wrinkling of the leaf-surface results. As the disease progresses certain of the paler and thinner portions of the leaf die out prematurely in a manner not altogether unlike that which is seen in fully ripe leaves, though to a much greater degree. When one leaf is diseased, all the younger leaves of the same plant also show the disease, but in correspondingly earlier stages. Frequently several diseased plants occur together in the field, but, quite as often, sound and diseased plants are irregularly distributed and a diseased plant never appears to be a source of contagion to those surrounding it.

From this description and the colored figures which accompany it, it is difficult to avoid the conclusion that the "Mosaic" of Dutch tobacco is the same as the "Calico" of Connecticut tobacco. As to the cause of the former, Mayer's

* Die landwirthschaftlichen Versuchs-Stationen, Bd. XXXII, p. 451. 1885.

investigations exclude the theories of a deficiency in the supply of plant-food; the attacks of nematodes; sudden changes of atmospheric and other conditions in the hot-beds, where the seedlings are raised; mechanical injuries to the roots in transplanting; the sudden change from conditions of long-continued high temperature, as in the hot-bed, to the cooler temperature of the field; the use of seed from diseased plants; and finally, the presence of parasitic fungi. But it was discovered that the juice of a diseased plant, when introduced into the midrib of a leaf on a sound plant, would reproduce the disease, the "period of incubation" being regularly ten or eleven days. Nevertheless, neither microscopic examination of diseased leaf-tissue, nor cultures from its sap, availed to show the presence of bacteria in connection with the disease. The infectious sap was filtered, but it still retained its virulence; if, however, it was passed through a double filter-paper, Mayer found that it lost its infectious character. Heating the sap for several hours at 80° C. had the same effect upon it.

Mayer thereupon concludes that (1) "The mosaic of tobacco is a bacterial disease from which, however, the infectious organisms have not been isolated. Their form and life-history is therefore unknown. (2) The contagiousness of the disease, by the artificial transfer of sap, has been proved with certainty. Under natural conditions no evident contagion, from one plant to another, occurs. Seeds of diseased plants can produce sound plants. (3) The spread of the contagion must be sought in the soil of the field or hot-bed, since certain fields, especially those in continuous use (for tobacco culture) are peculiarly subject to the disease. A case of the transfer of the disease by means of the soil has never been proved."

Upon the basis of these conclusions, Mayer recommends the renewal of the soil in the hot-beds, rotation of crops, the removal of the stubs of diseased plants after the crop is harvested, and the use of fertilizer chemicals in place of stable-manure. Three years later, in a brief note, he records a case in which the renewal of the soil in a portion of a hot-bed resulted in the almost total elimination of the disease, while one quarter of the plants from hot-beds where the soil was not renewed were diseased.

We are not in a position to question these statements, but it is to be noted that the mere fact that sap from a diseased plant will induce similar symptoms of disease when injected into the

tissues of a sound plant is not, in itself, a conclusive proof that the cause of the disease is bacterial. Smith's researches upon peach-yellows have shown that a healthy tree budded from one affected with the disease will contract it, although there is not the slightest evidence that peach-yellows is a bacterial disease. The two cases are not precisely parallel since the energy of contagion in the case of yellows, resides, not in the extracted sap of the diseased tree, but in the vital cellular union between the diseased bud and the healthy stock; nevertheless, it serves as a general illustration of the fact above mentioned. But apart from this, Mayer's investigations must be regarded rather as circumstantial evidence than direct proof, since he has neither observed, nor succeeded in isolating, any specific germ.

Shortly after the publication of Mayer's observations, two Russian investigators described another disease of tobacco to which they gave the name of "Spotted Disease" (*Pockenkrankheit*).* This disease, according to these observers, appears in June as white or brown spots of various shapes and sizes upon the leaves. They are sometimes simple specks, sometimes half rings, circles, or zig-zag lines following or crossing the veins. The first sign of the disease is the appearance of one or more shiny spots on the surface of the leaf. The gloss becomes gradually more pronounced and presently the tissues composing it collapse to half their normal thickness. Later these tissues become dry and brown or bleached, and sometimes separate from the surrounding tissues which remain apparently sound. The time required for a leaf to become sprinkled over with such spots is very short, sometimes a single day. The trouble is worse on open, dry land, but a diseased plant is not a source of danger to its neighbors.

That this disease is different from Mayer's mosaic disease is indicated by the fact that although, as Mayer had previously stated, a leaf in the last stages of "mosaic" might show a characteristic spotting, the "spotted disease" is never preceded by the mottled appearance associated with "mosaic." Neither insects nor fungi were found to be the cause of the "spotted disease," no bacteria were found in the affected spots, and infection of sound plants with the extract of diseased leaves

* Iwanowsky & Poloftzoff, Mém. de l'Acad. Imp. d. Sc. de St. Petersbourg. XXXVII, No. 7. 1890.

failed to reproduce the disease. Hence it is concluded to be of a physiological character. Careful experiments by means of cultures in water and sand precluded the theory of a general or particular lack of the essential elements of plant-food as a cause of the spotting and, after numerous investigations, the conclusion was reached, and it appears to be incontrovertible, that a spotting of the lower leaves of a tobacco-plant may and does occur when the plant lacks water, owing to the drain of the upper and younger leaves upon the older, lower ones. A similar spotting of the middle leaves occurs whenever the plant, after having stood for some hours in a damp atmosphere, is suddenly transferred to a dry atmosphere, owing to the fact that, under such circumstances, the leaves transpire water faster than the roots can supply it. Such conditions are shown to exist in the field, and our authors conclude that cool, damp nights with abundant dew, followed by a sudden access of high temperature shortly after sunrise, accompanied by dry winds and rapid evaporation, are responsible for this peculiar spotting of tobacco leaves. "The 'spotted disease' of tobacco is a disease which first becomes apparent when a high degree of atmospheric humidity is succeeded by a period of rapid and excessive transpiration. A changeable climate, a few days of rain succeeded suddenly by hot sunshine, — rather than prolonged drought, causes the most severe spotting."

It is evident that in this so-called "spotted disease" of tobacco we have a disease very similar to, if not identical with, that known in Connecticut as "spotting," and, furthermore, that this disease is as distinct from the "mosaic" of foreign tobacco as "spotting" is from "calico." If the statements of the Russian investigators above mentioned are correct (and there is every reason for so regarding them), "spotting" is probably due to excessive transpiration induced by sudden atmospheric changes.

Returning now to the subject of "mosiac." In 1892 Iwanowsky* confirmed Mayer's statements that the sap of diseased leaves is contagious, that it loses its virulence upon being heated to nearly the boiling point, and that the disease is to be ascribed to bacterial infection. He denies, however, that the sap loses its virulence by filtration even through a

* Land-und Forstwirthschaft. 1892. Cf. Beih. z. Bot. Centralbl., Bd. III, p. 266.

Chamberland filter, and explains this fact on the ground that it contains a soluble poison excreted by the bacteria of "mosaic." Iwanowsky was unable to isolate the specific germ on artificial media, but he states that he saw the bacteria and proved their presence in the tissues of diseased leaves. Here he leaves the subject, giving no further information concerning the organism.

In 1894 the French investigators Prillieux and Delacroix* identified the "mosaic" disease with a similar disease of tobacco occurring in France, and known as "nielle" (smut). The latter is characterized by the formation of spots upon the leaf surface, where the tissue becomes dry and of a grayish-yellow color. These spots are surrounded by a dark colored line, where the cells are suberized (corky), and which limits the infected area. In the cells of the spots is found a motile bacillus, 0.66 μ long, united in chains and imparting a yellow color to culture media. The article containing these notes is brief and very incomplete. The description given of the French disease raises serious doubts as to whether it is at all similar to the "mosaic" as described by Mayer.

In 1897 Marchal described,† under the name "La Mosaïque du Tabac" (the mosaic of tobacco), a disease which, in outward appearance, is fairly comparable to the one described by Mayer. He emphasizes, however, the spotting of the leaves, which, as has been shown, must probably be regarded as a different trouble, and merely repeats the observations of Prillieux and Delacroix that in the tissues of the grayish spots limited by a darker border is found a short, motile bacillus, forming chains in culture media, imparting to the latter a yellow color, and capable of reproducing the disease by inoculations from pure cultures. He states further that this natural contagion is inactive in the field and does not spread from a diseased to a healthy plant, but that in the soil of the seed-beds, replete with organic matter, it finds conditions highly favorable to its development. Here it attacks the seedlings, but inasmuch as its presence in the latter is indicated by no external symptom, it is impossible to distinguish and discard the diseased plants at the time of transplanting. The renewal or the sterilization of the soil in the seed-beds is therefore the only practical method of controlling the disease.

* C'mpt's rend. hebd. des Séances de l'Acad. des Sc., CXVIII-XII, p. 668. 1894.
† Revue Mycologique, XIX, 73, p. 13. 1897.

Finally, very recently, Beijerinck has ascribed the "mosaic" of tobacco to the action of a fluid not associated with bacteria, unlike any known enzyme, though acting in a similar manner, and possessing the ability to increase when brought into intimate association with the living protoplasm of active, formative tissues. I have been unable to obtain the original article in which this substance and its effects are described, but from the abstracts which I have seen* I gather that a good deal more work upon the subject is necessary before the conclusions of the author can be unqualifiedly accepted. This, so far as I know, completes the record of foreign investigations upon this class of tobacco diseases. It is evident that they consist of a number of isolated observations, made by investigators in widely separated localities and stated in terms which leave much to be inferred. What methods were used to isolate the specific germ and to avoid external contamination; what was the exact behavior of the germ in artificial cultures; what symptoms were produced in sound tobacco plants by inoculation either with pure cultures of the germ or with the extract of diseased tissues; whether these symptoms were identical with those observed by other investigators; whether from plants artificially infected the specific germ could again be isolated, and whether the diseases occurring in France are identical with those observed in eastern Europe and Asia,— all such questions are of primary importance, but concerning none of them have we any scientifically conclusive statements, with the possible exception of the work of the Russian investigators regarding the cause of the "spotted disease." One observer names and describes a disease which he infers is due to bacteria; a second states that he has seen the germ in the tissues, but has failed to isolate it; a third has isolated a germ from diseased leaves, but, according to his description, the external symptoms accompanying the presence of the germ differ materially from those described by the first observer and agree more nearly with those stated by a fourth to be characteristic of quite another disease due to entirely different causes. In view of these facts it seems best to limit our attention for the present to the diseases of tobacco which have come under our personal observation, and to record only such facts regarding them as our own experiments may in future elucidate.

* Centralbl. Bakt. u. Par., 2 Abth. Bd. V, No. 1, pp. 27-33, 1899.

MISCELLANEOUS NOTES ON PLANT-DISEASES AND SPRAYING.

By Wm. C. Sturgis.

Monilia fructigena on the Peach. During the spring of 1898 many complaints were received to the effect that the blossoms and twigs of peach trees were rotting. The trouble was not confined to peaches, but was very common also on the ornamental shrub known as the Double-flowering Almond. Specimens received from various localities showed that the rotting was due to an exceptionally severe outbreak of the fungus, *Monilia fructigena*, which does so much damage to the stone fruits. It rarely happens that this fungus does serious injury except to the fruit and just before the latter ripens. But it will be remembered that the latter part of April and the whole of May were characterized by heavy rains and much damp weather, conditions peculiarly favorable to the growth of the fungus. Peach trees bloomed during the first week in May, and the blossoms, failing to set and being soaked by the continuous rains, fell an easy prey to the *Monilia*. After destroying the blossoms the fungus worked into the twigs, killing the tissues and causing the leaves to wither, turn brown and finally decay. From the infested tissues of the twigs and through cracks in the bark gum oozed in large drops, and after every rain the twigs, leaves and decaying flowers showed the ash-colored, dusty heaps of the fungous spores. During the fruiting season, also, the weather was exactly suited to the spread of this disease; during August the blighted twigs and leaves again became covered with the fungus which had been kept in abeyance by the dry weather of mid-summer, and it spread with great rapidity to the ripening fruit. Added to this, the wet weather of August induced a severe attack of the scab-fungus, *Cladosporium carpophilum*, so that it is doubtful if, in many years, the peach crop has been so disastrously affected by these two fungi.

As to remedial measures, some good would certainly have been done if, as soon as dry weather came, the blighted twigs had been cut off and burned. This was done in the case of a small double-flowering almond; the shrub recovered entirely and experienced no further damage from the fungus even dur-

ing the continuous wet weather of August. Judicious spraying, too, would have checked the rotting of the fruit, if we may judge by the excellent results attending the use of Bordeaux mixture in other places, notably in Delaware.* Our own experience, however, has been such as to cause us to hesitate before recommending the treatment of peach trees with Bordeaux mixture. Last year, in accordance with our advice, Mr. J. H. Hale of South Glastonbury sprayed a portion of his peach orchard, with the result that all of the sprayed trees lost their leaves. They recovered later and bore almost a full crop of fruit, but the loss of the leaves weakened the trees, and was undoubtedly caused by the Bordeaux mixture. During the past summer all of the fruit trees on the Station grounds, including a few peaches, Japanese plums, and apricots, were thoroughly sprayed with Bordeaux mixture made on the 6-4-50 formula. The foliage of quinces, pears, European plums, and apples was uninjured, but the peaches, Japanese plums, and apricots were completely defoliated, and the individual leaves presented the exact appearance of leaves affected with the shot-hole fungus. No fungus was found upon them and the injury was attributed entirely, and I believe rightly, to the Bordeaux mixture. I am unable to account for the discrepancy between this result and that uniformly obtained in Delaware, unless it be that our mixture was too strong. In Delaware six pounds of copper sulphate and nine pounds of lime are used in making fifty gallons of the mixture. We used the same proportion of copper sulphate but only four pounds of lime, on the supposition that sufficient lime to neutralize the whole of the copper sulphate would ensure the foliage against injury. This does not seem to be the case, and further experiments are needed to show just what form of Bordeaux mixture can be safely used upon peach trees.†

A Bacterial Blight of Lima Beans. Early in August the lima beans on the farm of Mr. S. B. Smith of East Haven began to show a peculiar blighted appearance. On the leaves were numerous reddish spots, circular in outline and bounded by a darker-colored border. Sometimes two or more of these spots coalesce. On the pods the first sign of the trouble is a small depressed spot, still green like the rest of the pod, but appear-

* See Del. Coll. Agr. Exp. Sta., Rep. IX, 1897, pp. 20–30.

† Cf. Corn. Univ. Agr. Exp. Sta., Bull. 164, pp. 385-388, 1899.

ing watery and translucent; later the tissues of such spots become discolored and the spots themselves finally resemble those on the leaves. Thin sections through such a spot show that the cells are filled with a motile bacillus apparently identical with *Bacillus Phaseoli*, Sm.* This bacterial blight was first noted on lima beans by Professor S. A. Beach of the New York Experiment Station.† In 1893 Professor B. D. Halsted described a similar disease on wax beans,* and it seems fairly certain that both diseases are caused by the same organism. On wax beans the disease has been known certainly since 1886, but its occurrence on lima beans seems to be more recent. That it bids fair to become a very serious trouble was evident from its effects upon the beans at Mr. Smith's. Within a week after its first appearance it had swept over the whole field, the vines looked as though they had been sprayed with some caustic liquid, and, although no exact determination was made, probably ten per cent. of the pods were rendered unmarketable, to say nothing of the weakening of the vines by the partial destruction of the foliage.

Halsted has shown§ that seed from blighted pods may reproduce the disease; that the latter is worse upon land which has previously borne a diseased crop, especially if any of the refuse remains on the land; that an excess of moisture is favorable to the spread of the disease, and that it may be checked in a measure by the use of Bordeaux mixture. Where this disease is prevalent, therefore, great care should be taken to secure seed from a locality known to be free from it; if the crop has been diseased, neither wax nor lima beans should be grown on that same soil the next year; well-drained land should be selected, and, if practicable, the vines should be thoroughly sprayed with Bordeaux mixture. Two sprayings between July 15th and August 15th would probably serve to lessen very decidedly the injury caused by both the bacterial blight and the mildew.

The Damping-off of Peas. The damping-off of seedlings is a trouble only too well known to every one who has had much to do with growing plants under glass. It is characterized by

* Proc. Am. Asso. Adv. Sc., XLVI, p. 288. 1898.
† N. Y. Agr. Exp. Sta., Bull. 48, p. 331. 1892.
‡ N. J. Agr. Exp. Sta., Rep. 13 (1892), p. 283. 1893.
§ N. J. Agr. Exp. Sta., Rep. 17 (1896), pp. 328–333, 1897.

a sudden wilting of the seedlings, due evidently to a decay of the stem at the surface of the soil. If the stem is examined in the early stages of the disease, the tissues will be found to be traversed in all directions by the colorless vegetative threads (*hyphae*) of a fungus. These threads produce various kinds of reproductive bodies which either have their rise in a sexual process (*oospores*) or are produced non-sexually (*conidia* and *zoospores*). The fungus has long been known and bears the name *Artotrogus De Baryanus* (Hesse).* It does not often cause serious damage in the open, since for its best development it requires a high temperature, considerable moisture, and a close atmosphere, but it greatly injured garden peas during the past summer, the young plants decaying to such an extent that in one locality, at least, it was a difficult matter to get a crop. Microscopic examination of the infested seedlings showed an abundance of *oospores* in the tissues of the stems. These agreed perfectly with those of *Artotrogus De Baryanus*, but, according to Hesse, this species does not attack peas. Atkinson mentions in the Cornell Bulletin above referred to, p. 252, a species,—*Artotrogus Sadebeckianus* (Wittmack), "producing epidemics of diseases in lupines and peas," but I have been unable to find any description of this species or to determine whether the one noted on peas is identical with this or not. In any case, the course to be followed in order to prevent a recurrence of the trouble would be the same, viz.: thin planting, to secure an abundance of light and air for the seedlings; the avoidance of a heavy soil containing an excess of water; and the use of chemical fertilizers where practicable, rather than barnyard manure, upon the organic matter of which the fungus can feed and grow.

Plant-Diseases and the Weather. There is a general impression that wet weather is in itself a cause of the fungous diseases of plants. This is based upon the fact that during a period of damp weather plants are prone to suffer from a variety of diseases known as mildews, blights, rusts, molds, etc., which are not apparent in dry weather. But, in so far as such diseases are connected with parasitic fungi, it is no more true that they are caused by wet weather than that the occurrence of weeds is due to that cause. A certain weed can only have

* For a full description of this and other "damping-off" fungi, see Cornell Univ. Agr. Exp. Sta., Bull. 94. 1895.

its origin in a seed of that same species, although the plant developed from that seed may require damp weather for its growth. In the same way and for the same reason a fungus has its origin in a spore which requires moisture for its germination and development. If there were no weed-seeds there would be no weeds; if there were no spores, speaking broadly, there would be no fungi or fungous diseases, no matter whether the weather were wet or dry. The past season has exemplified the connection which exists between wet weather and the spread of plant-diseases due to fungi, but in one case at least it has shown how dry weather may induce disease. About the middle of July it was noticed that wax beans were seriously diseased. The leaves were covered with large yellow blotches which in turn bore a copious growth of a black mold. The appearance of such leaves was very striking and it was thought at first that they were suffering from the attacks of one of the black "rusts." Further investigation, however, showed that the black mold was a species of *Alternaria*, which occurs commonly on dead leaf-tissues. For some time search was vainly made for the cause of the yellowing of the leaves, but finally a patch of beans was found on which the trouble had developed more recently. It was then seen that the leaves were infested beneath with the mite commonly known as "red spider," and that the yellow blotches corresponded to the areas where the mites were present in the largest numbers. Growers of plants under glass are familiar with the fact that the foliage of many plants, if kept dry, is subject to the attacks of "red spider," and that two or three syringings with clear water is sufficient to remedy the trouble. In a certain sense, then, this trouble is dependent upon the atmospheric conditions. The past season presented exceptionally favorable conditions for the "red spider." The month of June was extremely dry and the insects multiplied very rapidly on the lower surface of the bean-leaves; three heavy rains occurred on July 4th, 12th, and 13th, which sufficed to destroy the mites, but not before the latter had caused the yellowing of the leaves and the death of the tissues in large patches; the warm, damp weather which followed gave an opportunity for the development of fungi, and on the dead patches there soon appeared the black mold. It was a striking illustration of the effects of both dry and wet weather, not in directly causing a diseased condition, but in giving a

favorable opportunity for the development of parasitic organisms. Doubtless if the beans could have been thoroughly syringed with water two or three times in June, they would have remained healthy notwithstanding the dry weather.

A Convenient Method of Preparing Bordeaux Mixture in Small Quantities. In experimental work where small plots have to be sprayed, I proceed as follows, using the 5-5-50 formula as being at the same time efficient, safe, and readily divisible by 5 or 10. Half a pound of copper sulphate is dissolved in a quart of hot water and poured into a fruit-jar of that capacity; half a pound of lime is slacked, diluted with water to make a quart, and placed in another fruit-jar. These amounts are easily weighed out, the operation of dissolving and slacking can be done quickly, and in a couple of hours enough half-pound lots of sulphate and of lime can be prepared to make a good many gallons of Bordeaux mixture, and, if the jars are tightly closed, their contents will keep indefinitely. To make five gallons of Bordeaux mixture an ordinary wooden pail holding two gallons and a half, and a forty-pound (five-gallon) candy pail such as can be cheaply bought of any grocer, are needed. Into the latter is poured the contents of one jar of lime and the pail is then half filled with water. Into the small pail is emptied a jar of copper sulphate solution and this pail is then filled with water. Finally, by pouring the contents of the small pail quickly into the large pail and stirring well, a perfect Bordeaux mixture is obtained. If a weaker mixture is desired, the five gallons of full strength may be made up, half of it poured back into the smaller pail and then the larger pail filled up with water. Both solutions being dilute and being mixed quickly by a single operation, the hydroxide of copper is precipitated in a very finely divided form and does not settle readily or clog the nozzle.

Notes on Spraying Apparatus. During the past season we have experimented with a number of pumps adapted for use with a barrel or with a pail. Among the barrel-pumps, two have done admirable work. These are the "Eclipse, No. 2," manufactured by Messrs. Morrill & Morley of Benton Harbor, Mich., and the "Pomona," made by the Gould's Manufacturing Company of Seneca Falls, N. Y. The principle upon which these two pumps work is practically the same and was described in our Bulletin 125. The "Eclipse" works a little

more easily than the " Pomona," it is a trifle lighter, and the mechanism is simpler. On the other hand the " Pomona " is made in two forms adapted either to the head or the side of the barrel, while the " Eclipse " can only be used on the head. These pumps represent the most efficient type of spraying-pump on the market and both are thoroughly satisfactory.

The bamboo extension made by Morrill & Morley is the best appliance we have yet seen for directing a spray into the tops of trees. It is simply a light bamboo pole, bored out and lined with brass. When fitted with a double Vermorel nozzle it delivers a far-reaching spray, covering a large area.

Of all the pail-pumps which we have used, the " Success Kerosene Sprayer," manufactured by the Deming Company of Salem, Ohio, has proved the most serviceable. This pump has a detachable tank for kerosene, from which the oil is drawn by the stroke of the piston, is mixed in the cylinder with the water contained in the pail, and issues from the nozzle in the form of an emulsion. A gauge regulates the supply of kerosene from zero up to 50 per cent., and tests which we have made indicate that the gauge is fairly accurate. We have used this apparatus, with the gauge set to deliver 20 per cent. of kerosene, to destroy plant-lice on Viburnum, roses, honeysuckles, and other plants. The leaves were uninjured, while the lice were completely destroyed.

With the tank removed and the aperture closed by a screw-cap, this pump can be used with fungicides. It is well adapted for the spraying of plants on a small scale and was used with great satisfaction in some of our spraying work during the past season.

ROSE CULTURES.

By W. E. Britton.

In October, 1897, a small section of bench space in the forcing house having an area of 14.5 square feet was equally divided by a partition and one-half filled with compost, the other with a mixture of coal ashes and peat moss. To the latter were added 15 grams of nitrogen in nitrate of soda, 6 grams of phosphoric acid in dissolved bone black, and 30 grams of potash in muriate. For 100 square feet of bench space these applications would be 2 lbs. 12 oz. of nitrate, 1 lb. 1 oz. of dissolved bone black, and 1 lb. 15 oz. of muriate. Fifty grams of carbonate of lime were added to each plot. In the center of each plot was set a Duchesse de Brabant rose which had been growing for two years, and in the corners four other plants of the same variety of a year's growth.

The plants in the coal ashes at first dropped their leaves more than those in the compost, but soon put out new ones and began to bloom. The plants in both plots blossomed continually all winter and were exceedingly thrifty with perfect foliage, free from mildew. The plants set in coal ashes and peat gave larger blooms, but rather ligher in color than those from the compost plot. There was no difference as regards fragrance and form. The first blossom was picked December 4th, and the last one June 2d, when the plants were removed from the benches. The fertilizers added as well as the yields obtained is given in the following table:

Rose Cultures.

Soil.	Plot 207 A. Compost.	Plot 207 B. Coal Ashes and Peat Moss.
Fertilizers (grams)—		
Nitrate of soda,	0	94.8
Equivalent nitrogen,	..	15.
Dissolved boneblack,	0	35.34
Equivalent phosphoric acid,	..	6.
Muriate of potash,	0	64.5
Equivalent potash,	..	30.
Yield—		
Total number of blooms,	42	58
Average diameter of blooms, inches,	2.20	2.28
Average length of stem, inches,	4	4.8
Average weight of blooms, grams,	5	6

ENTOMOLOGICAL NOTES.

By W. E. Britton.

Ravages of the Squash Lady-Beetle. — The squash lady-bird, *Epilachna borealis*, Fabr, injured squash vines at the Station by devouring the foliage during August and September. Most of the lady-beetles (*Coccinellidæ*) are beneficial instead of injurious, and feed upon other insects such as plant-lice, scales, and larvæ. There are two or three species, however, that injure cultivated plants, and *E. borealis* is the one most commonly found in the Northern and Eastern States. The insect feeds in both the larval and adult stages. The adult has a curious habit of marking out a circular area upon the leaf and then feeding within this area until all the soft tissue has been devoured, when another feeding ground is marked out and in turn exhausted. The eggs are deposited in clusters on the leaves and hatch in about twelve days, according to Professor J. B. Smith,* who has given the species considerable study. Smith states that he observed a newly-hatched larva devour several unhatched eggs of the cluster, showing that the carnivorous habits of the family have not been overcome entirely in this herbivorous species. Most of the feeding is done, however, in the larval state. The larva is light yellow in color and covered with black forked spines. Pupæ are also found upon the leaves. The adult beetle is yellowish-brown in color with seven black spots upon each wing-cover and four smaller ones upon the thorax. It is about three-eighths of an inch in length. This is the first time in five years that the species has been injurious in the Station garden. An application of arsenical poison when the beetles first commence to feed will prevent any serious injury.

Genista Injured by Blister Beetles. — Several species of "blister beetles" feed upon a great variety of plants. About the middle of June some plants of *Genista tinctoria* in an ornamental planting were considerably injured by a gray blister beetle, *Macrobasis unicolor*, Kirby. Hand-picking was practiced in this case, but an application of paris green or any of the other arsenites would probably prevent any great injury.

Leaf-Beetle on the Hornbeam. — On May 30th, adults of *Serica trociformis*, Burm., were abundant on young trees of the

* New Jersey Experiment Station, bulletin 94.

hornbeam or water beech, *Carpinus Caroliniana*, in Westville. The foliage was completely riddled in some cases. Both sexes were present. The female is of a reddish brown color with black head and thorax. The male is of a uniform color and nearly black. This beetle is about one-fourth of an inch in length and both male and female are about the same size. Poisoning of the foliage will, of course, prevent it from being seriously injured by this beetle.

Elm Leaf Beetle. — The elm leaf beetle, *Galerucella luteola*, Mull., which for the last few years has seriously injured elm trees in Connecticut, was much less abundant during 1898 than for several seasons previous. It could be found, however, without much hunting, and many small trees in New Haven were defoliated. On most of the larger trees the injury was scarcely noticeable; in one or two localities the trees presented a brown color, caused by the larvæ of this beetle devouring the green portion of the foliage. We are probably not yet rid of the pest, and tree owners and municipal authorities should be on the watch for its appearance the coming season, fully prepared to save the trees if the beetle appears to be present in threatening numbers.

A Borer in Plum Trees. — During June Mr. M. N. Wooding of Hamden sent to the Station a section of the trunk of a Japan plum tree which was infested with borers. The piece of wood was placed in the breeding cage until we had time to examine it. Meantime, the borers did not seem inclined to emerge from their burrows or tunnels, the openings of which were plainly discernible scattered over the bark. Upon splitting open the tree-trunk many small dark-colored beetles were found in the burrows. The larval and pupal stages were also represented. The species is closely allied to, but entirely distinct from, the destructive "fruit bark beetle" that has become so well known in Connecticut orchards. The former burrows wholly inside the wood, while the latter works between the wood and the bark. By the courtesy of Dr. L. O. Howard, entomologist of the Department of Agriculture, Washington, D. C., one of his assistants identified the species as *Xyleborus pyri*, Peck. It is now considered identical with the European *X. dispar*, Fabr. Miss Ormerod states* that this insect was rare in England until ten years ago, when it seriously damaged

* A Text-Book of Agricultural Entomology, p. 101.

young plum trees in two or three localities. In this country the beetle occasionally injures the tulip tree (*Liriodendron*) and various kinds of fruit trees. Both sexes were found in the tunnels.

The female is about one-eighth of an inch in length and one-sixteenth in breadth. The male is considerable smaller, being three-thirty-seconds of an inch long and having about the same breadth of body as the female. The male, however, is much thinner and the extremities of the body taper much less abruptly. Both sexes are black or dark brown in color.

The tunnels were cylindrical in shape and extended to the center of the trunk, which was about three inches in diameter. Ramifications were not numerous, but were found in several clefts. A fungus was growing inside the tunnels, and is said to be " cultivated " by several species of beetles whose larvæ as well as adults feed upon it inside the burrows. *Xyleborus dispar* is often called the " pear blight beetle," but it has no connection with either the fungous or the bacterial disease of the pear sometimes called " pear blight."

It is doubtful if a satisfactory remedy can be suggested against the injury done by *Xyleborus dispar*, which is likely to be only occasional. Perhaps if the trunks and branches of trees are coated with whitewash or Bordeaux mixture to which a little Paris green has been added, an attack may be prevented.

The Oak Pruner. — During the latter part of summer, the ground underneath many of the oak trees in and about New Haven was thickly strewn with twigs which had fallen from them as if broken off by the wind. Examination of these twigs showed that each one had been eaten nearly off, and that it contained a burrow usually at the pith. If the twig were split open along the line of the burrow, a borer about three-eighths of an inch long would be found inside. This is the half-grown larva of a small brown beetle, *Elaphidion villosum*, Fabr.

The beetle deposits the egg near the tip of a young branch and when hatched the borer works his way inside the twig and burrows along the pith. When nearly half-grown he cuts the twig nearly off and retreats into his burrow. These twigs, almost severed by the larvæ, are easily broken off by winds and fall to the ground. The borer remains in his burrow in the fallen twig until the following spring, sometimes in the larval

and sometimes in the pupal state. The adult appears about midsummer.

The only remedial treatment that can be recommended against this curious insect is to gather and burn all infested twigs, thus destroying the larvæ in the burrows, and somewhat lessening the number the following year.

Kerosene and the San José Scale. — Since preparing the last Annual Report, the San José scale has been reported from Ivoryton, Nichols, Cheshire, Burnside, and Rowayton. In addition to these new places, new centers of infection have been discovered in New Haven, Hartford, and Bridgeport.

There are indications that the scale spreads somewhat less rapidly in Connecticut than many believed it would, but it still remains a dreaded pest of the fruit grower, and orchardists and nurserymen need to be always on the watch lest the insect be introduced into their domains.

Spraying with clear kerosene has been given a trial in Connecticut. On the 1st of last March several seriously infested Japan plum trees in New Haven were sprayed with kerosene. Two months later no living scales could be found. The kerosene was purchased in the market for illuminating purposes and was supposed to be of good quality. It was applied by means of a "Success" bucket pump, through a Vermorel nozzle, and the spraying was done on a bright day with plenty of air stirring, so that evaporation would be rapid. Where the kerosene was applied with care, little or no injury resulted. One tree literally covered with scales from top to bottom was drenched with kerosene; nearly all the branches were killed back about half way to the trunk.

At the Station, uninfested trees of apple, pear, peach, plum, cherry, and quince were sprayed with kerosene on February 28th. For several weeks no injury was apparent. Later, it was observed that some of the fruit buds and small twigs had been killed.

Spraying with clear kerosene is scarcely a safe treatment for the average grower to employ. If his trees are infested he had better apply kerosene and water, which will do less injury and will kill the scale. At the Cornell Station, excellent results were obtained by using a mixture containing 20 per cent. of kerosene. For this work a special pump is necessary. A suitable outfit has been figured in Bulletin 126, p. 7, of this Station.

A similar pump is now manufactured by the Goulds Manufacturing Company of Seneca Falls, N. Y.

Elm Scale. — On June 14th my attention was called to a young elm tree near the Station that was infested with scales. I found the insect to be the elm scale, *Gossyparia ulmi*, Geoff. It was easily killed by washing the tree with a strong solution of ordinary soap. Whale-oil soap would probably be better.

Other Scale Insects. — Various species of scale insects have been received during the season from different sections of the State. Among the most common are the "Oyster Shell Bark-Louse," *Mytilaspis pomorum*, Bouché, and the "Scurfy Bark-Louse," *Chionaspis furfurus*, Fitch. The former is especially common upon apple, lilac, birch, ash, willow, and poplar, and is a long and slender curved scale, nearly the same color as the bark upon which it is fastened. The latter species is light gray in color, is broad and pear-shaped and commonly infests the apple and pear. Both of these insects winter as eggs, which are not easily killed by insecticides, but if the infested trees are treated with whale-oil soap solution just after the eggs hatch, or about June 1st, the young insects are very easily destroyed.

The Rose scale, *Diaspis rosæ*, Sand., is also received here frequently. This is a large scale, the adult females being one-eighth of an inch in diameter, nearly circular in outline, very light gray in color, and found upon the rose, blackberry, raspberry, and sometimes the pear. The "tulip scale," *Lecanium tulipiferæ*, Cook, is also common. It is a large brown scale nearly hemispherical in shape and infests the small branches of the tulip tree.

A *Lecanium* on the grape was received in June from Bristol; it has not yet been determined, and perhaps is a new species. The several species comprising the genus *Lecanium* have no armor and are called soft scales. They are very susceptible to contact insecticides such as whale-oil soap solution, and the rose scale can be controlled in the same manner.

Woolly Aphis on Pine. — About the middle of June plant lice were noticed on several small pine trees (*Pinus strobus*) growing at the Station. Their bodies were covered with a whitish cottony substance, and they resembled the well-known woolly aphis of the apple, and answered the description of a closely allied species, *Schizoneura pinicola*, Thomas. A single

spraying with fir tree oil rid the trees of their woolly parasites.

The Pear Psylla. — *Psylla pyricola,* Först., was unusually abundant throughout Connecticut in 1898. It was first noticed at the Station about July 1st and had then somewhat injured the pear trees.

The pear psylla is a jumping plant louse of about one-tenth of an inch in length. It injures the trees by sucking the sap from the tender twigs. It exudes a sweet sticky " honey-dew," which soon covers the foliage and branches. In the honey-dew a fungus grows, giving the trees a blackened sooty appearance. The leaves usually turn yellow or red and fall prematurely.

This insect is rather hard to control and an insecticide which kills by contact should be used against it. The most vulnerable period in its life history is just after the leaves of the pear tree expand in the spring. Honey-dew is not then abundant, and a thorough application of kerosene emulsion or whale-oil soap will destroy many of the insects. If it becomes necessary to give a later treatment, the application should be made after a rain, as some of the honey-dew is then washed off and the insecticide will be more likely to come in contact with the insects.

Peas Injured by the Zebra Caterpillar. — On June 14th, pea vines in the Station garden were fast being devoured by small caterpillars. Several plants had already been stripped of their leaves. The young larvæ placed in the breeding-cage and properly fed grew rapidly, and after one or two moultings were easily recognized as the larvæ of the zebra moth, *Mamestra picta,* Harr. This identification was confirmed later by the emergence of the adults.

Many garden plants are subject to an occasional attack from this species, but it is rather seldom that much injury is caused. The arsenites will keep it in check if properly applied.

Red Humped Caterpillar. — This caterpillar was abundant on some black walnut (*Juglans nigra*) seedlings at the Station during September. The larvæ were rapidly devouring the foliage when found and further injury was prevented by gathering the caterpillars. Spraying with the arsenites is the usual remedy. The insect is known as *Œdemasia concinna,* S. & A., and frequently feeds upon the foliage of the apple tree.

Chrysanthemum Stalk Borer.— On June 29th, some chrysan-

themum stems were sent to the Station from Newington. The plants had been injured by some insect that burrowed in the pith. In one of the stalks was a larva of the moth, *Gortyna nitela*, Gueneé, and this species was probably the author of the injury. Cornstalks containing larvæ of the same species were also received during the season. There is no remedy except to destroy the insects when found.

Angoumois Grain Moth. — October 11th some ears of popcorn were sent to the Station from a large storehouse. The grain was thoroughly infested with the Angoumois Grain Moth, *Sitotroga cereallella*, Oliv., which is abundant in granaries and storehouses throughout the eastern United States, and which attacks growing corn in the South.

The best remedy is to enclose the grain in tight boxes or bins and treat with carbon bisulphide, using one pound of the liquid for each one hundred bushels of grain.

EXPERIMENTS IN CHESTNUT GRAFTING.

By W. E. Britton.

Purpose of Experiments. — Since the coming of the Japanese chestnuts a new interest in chestnut culture has been awakened in Connecticut. The native chestnut *Castanea dentata*, (Marsh.) Borkh. grows naturally throughout the State and covers a considerable portion of the wooded area. Trees have been cut over many acres and some of the sprouts issuing from the stumps are of a suitable size to graft. It has long been known that the chestnut could be grafted, and since the improved varieties of European and Japanese chestnuts were obtained there have been many attempts to graft these upon the native stocks. The practice, however, has not been wholly successful, and the work described in this paper was carried out in order to determine the most favorable time for setting cions in this latitude, and also the best methods of grafting.

Stocks. — The stocks used were all of the American species; the cions were set either in the more thrifty branches of large trees, in young seedlings, or in sprouts which had sprung up from the stumps of a previous growth of chestnut timber.

Cions of the following varieties, representing two botanical species, were used in the experiment, viz.: European Chestnut, *Castanea Castanea* (L.) Sudworth: varieties, Paragon, Ridgely, Comfort, and Numbo; Japanese Chestnut, *Castanea Japonica*, Blume: varieties, Alpha, Reliance, Superb.

A portion of the cions were bought from the Pomona Nurseries, Parry, N. J., and others were kindly given by Mr. J. H. Hale of South Glastonbury and Mr. N. S. Platt of New Haven. All the cions were dormant when set. After being cut from the trees they were kept in a dormant condition by storing them in damp sand in a dark portion of the ice-house.

Characteristics of the Cions. — It will be interesting and profitable to note briefly the difference in twigs or cions between the American, European, and Japanese species. Though this is a botanical consideration it is of practical value, and has been mentioned much less frequently in chestnut literature than the characters of the foliage and fruit, which will not be touched upon in this paper. A person familiar with the three kinds of chestnuts can usually distinguish them by the appearance of the matured twigs or cions. The three species

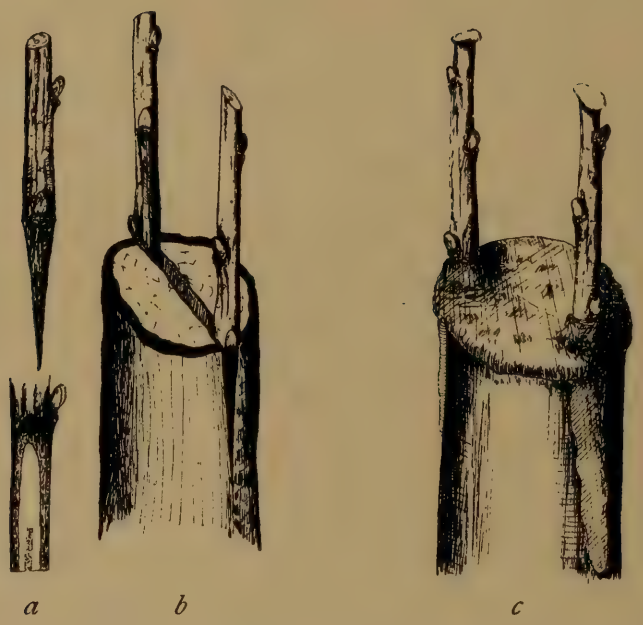
are represented by their twigs in Plate 1. Each has alternate buds borne upon opposite sides of the shoot.

American Chestnut twigs are rather slender, nearly cylindrical though often irregular, and considerably enlarged below the buds. The buds are prominent, but smaller and closer together than the European. Twigs often branch on young and vigorous trees and such wood is more apt to have an irregular and fluted surface than the cions taken from large trees. The twigs seem to be somewhat lighter and duller in color than those of the other species, though the color probably varies greatly in the several varieties.

European Chestnut twigs are long-jointed with an angular or irregularly fluted or corrugated surface and much thickened just below and in the direction of the buds. Cions of Paragon and Ridgely are extremely irregular, while those of Numbo and Comfort are more nearly circular in cross-section. The species is a strong grower, the cions often making a growth of five or six feet the first season. (Plate 2.) The wood is therefore large and coarse, tapering slowly toward the tip, with the buds large and far apart. Fewer cions to the foot can be cut from this wood than from either the American or Japanese species. The wood is also much harder to work in grafting on account of the irregularity of surface. A vigorous shoot often branches or produces laterals the same season.

The lenticels or white spots on the bark of the four varieties here noticed are far more abundant than on twigs of the American or Japanese chestnuts. This is especially true of the Paragon. The leaf-scars below the buds are also larger and of different shape.

Japanese Chestnuts produce cions which are very unlike the European. The wood is nearly cylindrical, though slightly flattened, the greatest diameter being between the sides which bear the buds. The buds are small, almost triangular with acute points, and are much nearer together on the stem than in either the American or European chestnuts. The twigs are smooth and of good size at the base, but there is a greater tendency for the young growth to branch (*i. e.*, produce laterals) than in the other species; so that it is common to find forked cions, and above the fork the wood is small and slender, tapering to a size that is altogether too small to use for cions except in very small stocks. These slender tips should be discarded.



a *b* *c*

FIG. 1. — Cleft-grafting; *a* shows how the cions should be cut; *b*, cions set in stock; *c*, the same waxed.

Forms of Grafts Employed. — 1. The *common cleft-graft* (see Fig. 1.) was chiefly used. Two cions were usually placed in each stock; in a few small stocks single cions were set. Where cleft-grafting is practiced the best results will be obtained in selecting stocks between one-half and one and one-half inches in diameter. Except in very small stocks this form of graft needs no tying; the pressure of the stock holds the cion in place.

a *b* *c*

PLATE I.—CHESTNUT TWIGS.

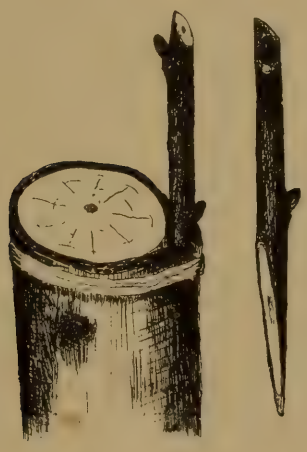
a American chestnut; *C. dentata* (Marsh) Borkh.
b European chestnut; *C. castanea* (L.) Sudworth.
c Japanese chestnut; *C. japonica* Blume.

PLATE 2.— Chestnut cleft-graft; Ridgely cions set May 6th; grew over six feet the first season.

2. The *tongue or whip graft* was employed where it seemed desirable to graft small twigs nearly as small as the cion itself. A better union of cion and stock followed this form of graft. The tongue graft and the method of preparing the cion are shown in Fig. 2. This graft should always be tied.

a *b*

FIG. 2. — Tongue or whip graft; *a* shows manner of preparing stock and cion; *b*, the same, put together and tied.



b *a*

FIG. 3. — Bark graft; *a* shows method of cutting cion; *b* cion has been inserted and tied, but not waxed.

The third form of graft may be called a *bark graft.** The cion is cut wholly on one side to the form of a wedge. During the grafting season the bark of the chestnut separates easily from the wood and usually the cion can be readily pushed into its place after inserting the point between the bark and wood of the stock. A knife is sometimes necessary to make an opening. The bark of the stock usually splits open along the outside of the cion; but the bark alone of the cion is exposed so that the split does no harm. It is safer to tie this form of graft (which is shown in Fig. 3), though in several cases a union and good growth were made where not tied.

Preparing and Setting the Cions. — It is a common practice with grafters to cut the cions into sections, each portion having two buds, or more if the buds are close together, as in case of the Japanese chestnut. The lower end of the cion is then cut in the shape of a wedge on one or two sides, according to the form of graft to be made. Clean cuts should be made, and for this purpose it is imperative that a very sharp knife be used. The cut should be smooth and even, and is better if made with a single sweep of the knife. After sawing off the stock at a convenient size, it is advisable to pare the outer edge of the cut surface of the stock with a sharp knife. This probably allows a more perfect contact with the wax and favors the healing of the wound, but the principal reason for doing it is to remove the torn wood so that the grafter can see to get the cion in the proper place. The stock is then split and a wedge is driven into the cleft to open it. The cions are then set in the cleft with the cambium (or inner bark) of the cion directly in contact with the cambium of the stock. Great care should be taken in setting the cions. The knife for splitting and the wedge for opening the stock are usually combined in one tool, different forms of which are shown in Fig. 4, and which may be procured from almost any seedsman or nurseryman. A good pocket knife is the only tool needed in making a tongue graft, and a grafting tool is used only in a cleft-graft.

Waxing the Grafts. — Whichever form of graft is employed, the cut and cleft surfaces of stock and cion should always be protected by covering with wax. This keeps the graft from

* Some writers call this a *crown graft*, but a *crown graft* may be any sort of a graft at the crown of the tree or plant, *i. e.*, at the surface of the ground. To avoid confusion, therefore, I prefer to call the graft herein described a *bark graft*.

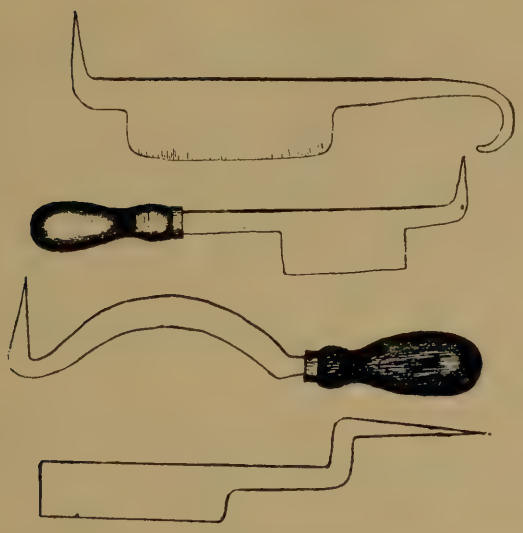


FIG. 4. — Various forms of grafting tools.

drying out and at the same time prevents the germs of decay from coming in contact with the mutilated surfaces of the wood. In the experiments herein described wax was used liberally and great care exercised that it be made to adhere firmly to the stock and cions, leaving no possible chances for air to enter or water to escape. The tops of the cions where cut were also well covered with wax.

Grafting Wax. — There are various formulas for making grafting wax, and doubtless most of them give good results. The wax used in this experiment was made after the following formula, which the writer prefers to some others:

Common Rosin,	4 pounds.
Tallow,	1 pound.
Beeswax,	1 "
Gum Shellac,	½ ounce.

The tallow should be melted first in a kettle over a fire; the rosin should then be added, and when nearly melted add the beeswax. After all is in liquid form add the shellac and stir constantly to prevent the last-named substance from collecting in lumps or from burning on the bottom of the kettle. Pour the contents of the kettle when well melted into a greased basin filled with water. After a few minutes separate the wax into lumps of from one-quarter to one-half pound each, and "pull" vigorously until uniform in color and texture. It is then ready for use. If not well "pulled" or "worked," it will be of a dark color and lumpy.

Tying Material. — Raffia is the best and cheapest tying material and was used in this work. It should be moistened before using. Many grafters prefer to combine their tying material with the wax by using strips of cotton cloth that have been dipped in the melted wax. These strips are wound about the graft, which requires no extra tying or waxing. Cotton twine, yarn, or any pliable fiber may be used for tying, but the flat bark fibers are better, as there is less danger of cutting or girdling the graft. Any material should be cut when the graft begins to enlarge.

Time and Place of Grafting. More than 200 cions were set in five localities in or near New Haven. The first grafting was done April 20th, but the cions made no growth for a month. The stocks were then well advanced in growth. Of the cions set, four were knocked out of place, two pulled out by boys, and four made good growth, but were broken off, presumably by winds. Twelve started to grow and then died; ten of these were set in thrifty sprouts growing upon the top of a dry gravelly knoll and were killed by drought. The cions which started to grow and afterwards failed are excluded from the percentages given in the table below.

TABLE 1. — RESULTS OF CHESTNUT GRAFTING, 1898.

Time of setting cions.	No. of cions set.	Alive October 1st.		
		No. of cions alive.	Per cent. of No. set.	Average growth.
Between April 20th and May 1st,	29	3	10	18 inches
" May 1st and May 15th, .	56	26	46	28 "
" May 15th and June 1st,	41	13	32	23 "
" June 1st and June 15th,	47	22	47	22 "
After June 15th, ...	12	2	17	8 "

From the table it appears that a greater percentage of cions failed among those set previous to May 1st and after June 15th than among those set between these dates. Of cions set during the first half of May and those set during the first half of June the percentages that grew are practically the same. Of cions set the latter half of May a somewhat smaller percentage survived, probably because they were set in the tops of large

trees, while the others were mostly placed in thrifty young sprouts or seedlings of convenient size to graft while standing on the ground.

It should also be mentioned that the cions first set were mostly of the Japanese varieties, which are more dwarf in habit than the European chestnuts and do not grow as rapidly; therefore the average growth was rather small for early set cions.

In making the grafts some of the stocks were fully exposed to the sun. This was especially the case in the top of a large tree on the Station grounds. These stocks were seriously injured by "sun-scald," in some cases the whole branch dying back to the fork or body of the tree. It is advisable to leave a portion of the branches with enough foliage to afford a partial shade for a few weeks after the cions have been set. These should be mostly removed later, though some may be saved to graft the following season. Where the stock has been injured in this manner, the cion, if it grows at all, will probably never make a good union with the stock. With small stocks there is less surface to "callus" and heal over, hence a better union. Where the "whip" or "tongue" graft was employed, the union is smoother and looks better than with the other forms of grafting. The bark graft is probably the least satisfactory in this respect. Injury from winds may be prevented by tying the graft to a stake or some other support.

Experience of Others. — During the seasons of 1895 and 1896 the late Judge A. J. Coe had considerable grafting done upon some chestnut sprout-land in Meriden. Most of the sprouts of convenient size growing on eighteen acres were cleft-grafted. The cions were of two varieties originated by Luther Burbank of Santa Rosa, California, and belonged to the Japanese species (*C. Japonica*, Blume). These varieties have since been named "Coe" and "McFarland." A portion of the cions grew and a considerable number of these were afterward destroyed by fire. The writer made several visits to the orchard in 1897, and while no accurate census was taken, the proportion of grafts which lived and grew was probably not over thirty or thirty-five per cent.

Upon request, Mr. J. H. Hale has kindly furnished the following information regarding his experience in chestnut grafting:

"My experiments thus far have been mostly with such

varieties as Numbo and Paragon, which are of the European type and have not united as readily with our native stocks as the Japanese varieties we have tested.

" In the spring of '97 we put in about 600 grafts, beginning when the leaves were just sprouting on the stocks and finishing up a week or ten days later. The cions were perfectly dormant, having been kept so on ice. Fully 50 per cent. of them started to grow, but after attaining a growth of from four to six inches many of them died out, so that about 25 per cent. only lived and grew through the season. Of the Japanese variety, Reliance, about 75 per cent. made a good growth, and two of these cions are now fruiting freely this year. The stocks were mostly sprouts one to two inches in diameter; 'cleft,' ' saddle,' and ' tongue ' grafting were practiced, ' cleft ' grafting being the least successful.

" From our own experience here and observation in the Pennsylvania nut orchards, I am under the impression that tongue grafting on small stocks, not over a half inch in diameter, is likely to prove the most successful."

Mr. N. S. Platt was asked to give an account of his chestnut grafting. He kindly replied as follows:

"I have grafted only three kinds of chestnuts, the Paragon, Numbo, and Japanese. The young wood of the Paragon is coarse and angular, and cions are not so easily set in a cleft or bark graft as the Numbo, which has slender long-jointed wood. The latter variety I usually set by paring the graft on one side, leaving the pared portion long and slender and inserting it under the bark on one side of the stock.

" I used stocks about five-eighths to three-fourths inches in diameter where the cion was inserted. The graft, when set in this way, needs to be supported by tying to a stake from the time it has grown five or six inches till the end of the second year, to prevent it from blowing out; by that time the junction is usually strong.

Some Japanese grafts that I set in the top of a large tree, perhaps ten inches in diameter at the ground and four inches where grafted, grew for a year or two, but the junction was not good between the two, and all failed.

" I have usually splice-grafted the Paragon, using strips of waxed cloth and sometimes tying raffia over the cloth to bring all snugly together. As soon as the graft and stock enlarge, the raffia must be cut.

" For stocks I have gathered nuts myself and planted them; have purchased and planted Paragon nuts, and have purchased one year sweet chestnut seedlings from Ohio. Have had all these in nursery rows and grafted them there. I put Paragon grafts in Paragon stocks, but also put Paragon and Numbo into both native and Ohio stocks. The union of graft with stock has been good with these two kinds in all the stocks used. The Paragon stocks were the more rapid growers, but the grafts lived no better and made no better union in Paragons than in natives. I set one hundred or more buds, but all failed. Grafting at the surface of the ground and root grafting were also failures. I employed Thomas Meehan & Sons to root graft and plant 1,000 stocks, I agreeing to take all that grew at a certain price. Mr. Meehan said to start with he did not know what could be done, but that he had an expert grafter and would like to try. At the end of the season he wrote me that he could find but two alive. The most of my grafting was done in the nursery rows, and to get trees for sale I preferred to graft three feet high and liked a stem one-fourth to three-fourths inches in diameter where grafted; if the former size, I would use the splice graft; if larger, the bark graft.

" Have sometimes had fifty per cent. of grafts start to grow, though often not more than thirty-three or twenty-five per cent. Have uniformly kept the cions in ice-houses lying flat on the ice, till new growth on the stocks is one or two inches long. For cions have used wood grown the previous season, also some a year older that contained good buds or spurs. Have found the after care during the first season almost as important as the grafting. The chestnut graft seems to need a full supply of sap till at least half the first season is passed, and it must have it or it will dry up in the midst of growth. See to this by keeping off robber shoots and by cutting off additional branches if there are any, even though in full leaf and growth.

" One of my first trees to graft was a wild tree about six inches in diameter, and in it I set cions in about eight stocks. Cions lived in about two-thirds of the stocks, but because I gave them no help all died in mid-summer. If I had cut off additional branches after growth had commenced, it would probably have saved them."

Conclusions. — Though the chestnut cannot be grafted as successfully as the apple or pear, about 50 per cent. of good

cions can be made to grow on proper stocks, if the work is done carefully and at the right time.

From a single season's experience (1898) it would appear that the best time for grafting chestnuts in this vicinity is from May 15th to June 15th. Early set cions made no growth until about May 20th. Growth on the stocks was then well advanced.

Do not remove all the foliage from around the graft at first, as it should be shaded for a time; otherwise the stock may be seriously injured or entirely killed by the sun. This injury is most likely to occur where the stocks are large. Many of the cions will need supporting, after growth begins, or they will be broken off by strong winds.

The best union results from " whip " or " tongue " grafting on small stocks.

Chestnut Literature. — If the reader desires further information on this subject, or to acquaint himself with the practices of commercial chestnut growing, he should consult the following publications:

The Nut Culturist, by A. S. Fuller, Orange Judd Company, N. Y., 1896.

Nut Culture, Division of Pomology, U. S. Department of Agriculture, Washington, D. C., 1896.

Nuts for Profit, by J. R. Parry, Parry, N. J., 1897.

The European and Japanese Chestnuts in the Eastern United States, by G. Harold Powell, Bulletin 42, Delaware Experiment Station, Newark, Del., 1898.

The author wishes to express his thanks to all who have aided his work, especially Messrs. Hale and Platt, who kindly supplied cions, and have contributed written accounts of their own experience in chestnut grafting.

ON THE AVAILABILITY TO GRASS OF NITROGEN IN FORM OF NITRATE OF SODA, COTTON-SEED MEAL, AND FINE HARD BONE.

By E H. Jenkins and W. E. Britton.

These experiments were made in galvanized iron pots, wired on the upper edge, eight inches in diameter and twelve inches deep. The bottom is slightly concave, and in the center of the bottom is a hole with a collar three-fourths of an inch in diameter. The pot is supported on three iron legs, so that the lowest point of the collar is two and one-half inches above the platform on which the pot stands. These pots are like those used in experiments described in our earlier reports. The soil used was a very sandy loam from a field which, it was stated, had not been manured, fertilized, or cultivated for many years. Six determinations of nitrogen in samples taken from as many different parts of the heap of soil which had been screened, mixed and ready for use, gave the following percentages of nitrogen: 0.097, 0.100, 0.100, 0.099, 0.099, 0.098. Each pot contained twenty-nine pounds of soil and 13.022 grams of soil-nitrogen. Each pot had an area of very nearly 1-125,000 of an acre.

To the soil of each pot was added 9.5 grams of precipitated calcium carbonate (containing lime equal to one ton of slaked lime per acre), 1.8 grams of muriate of potash, equivalent to about 500 pounds per acre and 1.2 grams of precipitated phosphate of lime (containing phosphoric acid equal to that in about 1,000 pounds of acid phosphate per acre), besides the nitrogenous fertilizer as indicated in Table I.

The three nitrogenous matters used were nitrate of soda, 15.89 per cent. of nitrogen; cotton-seed meal, 7.40 per cent., and Rogers & Hubbard's pure raw knuckle bone, with 3.67 per cent. of nitrogen. These materials were all sifted to pass circular holes one-fiftieth inch in diameter.

The quantities supplied to the soil of the several pots are given in Table I. They were equivalent to the following quantities per acre:

Nitrate of Soda,	461 lbs	per acre, and	231	pounds	per acre.
Cotton-seed Meal,	991 "	"	496	"	"
Bone,	1,990 "	"	995	"	"

The quantities of fertilizer-nitrogen were alike, whether ap-

plied in form of nitrate, cotton-seed meal, or ground bone. In each pot were first placed fourteen pounds of the soil under experiment. With fifteen pounds of the soil were carefully mixed the fertilizers mentioned above, and this mixture was then filled into the pot, great pains being taken to pack the soil alike in all the pots of the series.

The pots, including a layer of gravel on the bottom, weighed five pounds each, and each received twenty-nine pounds of soil, equivalent to twenty-five pounds twelve ounces of water-free soil. The soil with 15.50 per cent. of water in it contained 70 per cent. of the moisture which it could hold if saturated, and with 11.60 per cent. of water in it the soil had 50 per cent. of what it could hold if saturated.

During the course of these experiments the moisture content of the soil was therefore allowed to sink to 11.6 per cent., and was then raised, by adding water, partly on the surface and partly at the bottom, to 15.50 per cent., as determined by frequent weighings.

Into each pot were transplanted three small sets, cut from a turf of common red-top. One dozen such sets as were used for this purpose contained 0.052 grams nitrogen. The pots were filled and planted Feb. 14th to Feb. 17th, and stood till June 10th in the greenhouse, having a temperature by day of about 60° F., and by night about 50° F. During the summer the pots were placed in the summer vegetation house, and brought into the greenhouse again in October.

The grass was cut whenever it reached a length of three or four inches, thus imitating the practice of grazing or lawn-mowing, and all the clippings were carefully saved.

In early summer nitrogen was determined in the three clippings which had been already made, and again in the fall it was determined in the next three clippings. The first three clippings were made on March 31st, April 27th, and June 7th. The three later cuttings were made July 11th, Aug. 29th, and Oct. 1st. After the last cutting the growth was very slow, and the grass in every pot looked yellow, as if starving. A seventh cutting was, however, made on Jan. 7, 1899. The following table presents the results of this experiment:

TABLE I. ON THE AVAILABILITY TO GRASS OF NITROGEN IN NITRATE OF SODA, COTTON-SEED MEAL, AND FINE, HARD, RAW BONE.

EXPERIMENT OF 1898.

Station No.	Crop.	Nitrogenous Fertilizer.	Equivalent pounds per acre.	Nitrogen per pot.	1ST THREE CUTTINGS.		2D THREE CUTTINGS.		7TH CUTTING.		TOTAL CROP.	
					Air-dry Weight.	Grams Nitrogen.	Air-dry Weight.	Grams Nitrogen.	Air-dry Weight.	Grams Nitrogen.	Air-dry Weight.	Grams Nitrogen.
357	Grass	Nothing	0.00	0.00	10.6	.3795	14.9	.3248	1.7	.0356	27.2	.7399
358	"	"	0.00	0.00	11.4	.3887	16 3	.2950	1.4	.0282	29.1	.7119
359	"	"	0.00	0.00	12.0	.3972	17.4	.3149	1.8	.0343	31.2	.7464
360	"	"	0.00	0.00	10.9	.3793	13.4	.3015	1.8	.0367	26.1	.7175
361	"	Nitrate of Soda	461	2665	17.4	.5933	18.7	.3441	1.9	.0351	38.0	.9725
362	"	"	461	.2665	18.4	.6072	16.9	.3262	1.4	.0308	36.7	.9642
363	"	"	231	.1333	12.8	.4646	16.1	.3349	1.7	.0340	30.6	.8335
364	"	"	231	.1333	13.3	.4748	15.0	3315	1.1	.0245	29.4	.8308
365	"	Cot. Seed Meal	991	.2665	14.6	.5256	14.9	.3099	1.4	.0293	30.9	.8648
366	"	"	991	.2665	13.6	.5086	14.5	.3190	1.4	.0312	29.5	.8588
367	"	"	496	.1333	12.0	.4500	14.9	.3218	1.8	.0340	28.7	.8058
368	"	"	496	.1333	12.4	.4662	15.3	.3322	1.5	.0292	29.2	.8276
370	"	Ground Bone	1990	.2665	12.0	.4044	14.1	3017	1.6	.0374	27.7	.7435
371	"	"	995	.1333	12.5	.3988	11.8	.2714	1.2	.0255	25.5	.6957

Examination of the table shows that *the soil alone*, without nitrogenous fertilizer, yielded in the year's cropping, seven cuttings, from 26.1 to 31.2 grams, an average of 28.4 grams of air-dry crop, and from .7119 to .7464 grams, — an average of .7289 grams — of crop-nitrogen. The first three cuttings took an average of 11.2 grams of air-dry matter, with .3862 grams of nitrogen; the next four cuttings took more air-dry matter, 17.2 grams, but less nitrogen, .3428 grams.

That is, the first three crops had 3.45 per cent. of nitrogen, the next four only 2.00 per cent.

An application of *nitrate of soda* at the rate of 460 pounds per acre, pots 361 and 362, yielded in the year's cropping 37.4 grams of air-dry crop and .9683 grams nitrogen. Deducting what was cropped from pots which had no nitrogenous fertilizer we have 9.0 grams of air-dry crop and .2394 grams nitrogen as the added yield from the .2665 grams of nitrate-nitrogen in the fertilizer. That is, 90.0 per cent. of the nitrate-nitrogen of the fertilizer was recovered in the crop, and the weight of crop was increased by 31.7 per cent.

The percentage of nitrogen in the first three cuttings was 3.35 and in the subsequent cuttings only 1.90 per cent.

Use of one-half the aforesaid amount of nitrate, or 231 pounds per acre; — pots 363 and 364, — gave a total yield of 30.0 grams of air-dry crop, containing .8321 grams of nitrogen. Deducting the crop from unfertilized soil there remains 1.6 grams of crop and .1032 grams of nitrogen as the increase from .1333 grams of nitrate-nitrogen in the fertilizer. That is, 77.4 per cent. of the nitrate-nitrogen of the fertilizer was recovered in the crop, — a smaller proportion than where a double quantity of nitrate was used.

Here, as before, the earlier crops weighed less but had more nitrogen than the later. The percentages of nitrogen were in the first three cuttings 3.59, and in the subsequent cuttings 2.14. These figures show that an addition to the soil of nitrogen in the form of nitrate of soda at the rate of 460 pounds per acre, increased the yield of grass nearly one-third over what the same soil yielded without nitrogenous fertilizers. About nine-tenths of the nitrogen put on in the fertilizer was taken off again in the first year's cropping. Only one-tenth was lost or left in the soil, roots, and stubble.

On the other hand, 231 pounds of nitrate of soda per acre increased the crop by about one-eighteenth (5.6 per cent.). A little less than eight-tenths of the nitrogen put on in the fertilizer (231 pounds of nitrate of soda per acre) was taken off again in the cropping. Two-tenths were lost or left in the soil.

An application of *cotton-seed meal*, at the rate of 990 pounds per acre, yielded 30.2 grams of air-dry crop and .8618 grams of nitrogen. Deducting what was cropped in pots which received no fertilizer-nitrogen, there is left 1.8 grams of air-dry crop and .1329 grams of crop-nitrogen to be attributed to the .2665 grams of fertilizer-nitrogen in the cotton-seed meal; 49.9 per cent. of the fertilizer-nitrogen has been recovered in this crop, while the crop had been increased by 6.3 per cent. The percentage of nitrogen in the first three cuttings was 3.67 and in the following cuttings 2.14 per cent.

The total yield of air-dry crop from the smaller application of cotton-seed meal, 496 pounds per acre, was 29.0 grams, with .8167 grams of nitrogen. Deducting as before the yield of the soil without nitrogenous fertilizers, we have 0.6 grams of crop and .0878 grams nitrogen as the added yield produced by the

.1333 grams of fertilizer-nitrogen; 65.9 per cent. of the fertilizer-nitrogen has been recovered in the crop. But the total yield has been increased by only 2.1 per cent.

As before, the first three cuttings contained most nitrogen, 3.75 per cent., while the later cuttings contained only 2.14 per cent.

The last two pots of the series, Nos. 370 and 371, received an application of *fine and hard raw bone*; one at the rate of 1,990 pounds per acre, the other at half that rate.

As noted above, the four pots to which no fertilizer-nitrogen was added, yielded an average of 28.4 grams of crop, containing .7289 grams of nitrogen. Neither pot to which bone was added yielded as large a crop as this,—the amounts are 27.7 and 25.5 grams, — one of them yielded slightly more nitrogen than those which received no fertilizer-nitrogen, viz., 0.7435 grams, and the other slightly less, viz., 0.6957 gram. So that the nitrogen of the bone has increased neither the air-dry crop nor the crop-nitrogen appreciably, while that of nitrate of soda and of cotton-seed meal had a marked effect.

It appears that the effect of the nitrogenous fertilizers on the amount of crop-nitrogen was shown chiefly in the first three clippings. In the second half of the year the yield of nitrogen was not very much larger on those pots which had received fertilizer-nitrogen than on those which had received none.

But, on the other hand, the gross yield of air-dry crop was considerably greater in the latter part of the year than in the early part immediately following the application of the nitrogenous matters.

These facts appear in the following statement:

TABLE II.—EXPERIMENTS OF 1898, GRASS.

CROPS AND CROP-NITROGEN HARVESTED IN THE TWO HALF-YEARS.

FERTILIZER NITROGEN.		NITROGEN HARVESTED.		AIR-DRY CROP HARVESTED.	
In Form of	Amount. Pounds per Acre.	In First Half-Year. Grams.	In Second Half-Year. Grams.	In First Half-Year.	In Second Half-Year.
None, . . .	....	.3862	.3428	11.2	17.2
Nitrate of Soda, .	461	.6002	.3681	17.9	19 5
" " .	231	.4697	.3625	13.1	16 9
Cotton-seed Meal,	991	.5171	.3497	14.1	16.1
" " .	496	.4581	.3586	12.2	16.8
Raw Bone, . .	1,990	.4044	.3391	12.0	15.7
" .	995	.3988	.2969	12.5	13.0

Immediately after the last cutting the pots were top-dressed with the same forms of nitrogen which they originally received, and the experiment is continued. The surface of the soil is now in most cases nearly covered with a sod which has grown from the original three sets.

These tests illustrate certain facts regarding plant-food which may be briefly noted:

Here are pots each containing twenty-nine pounds of soil in which there is more than thirteen grams of soil-nitrogen; enough, at a low estimate, to produce thirteen maximum crops, *if it were available.*

Yet this soil cannot produce a single large crop, and in nearly an entire year, under very favorable conditions, has not yielded to the crop more than one-seventeenth of the nitrogen it contains. This fact well illustrates the inert character of the nitrogen in this soil. Again, an addition to this soil of .2665 grams of nitrogen in a quickly available form, increased the air-dry crop by nearly one-third. Yet this quantity of nitrogen is but one-fiftieth of the nitrogen originally in the soil; an amount almost too small to determine with accuracy by chemical means.

That is, an amount of fertilizer-nitrogen in the soil, which can barely be detected in the soil by chemical analysis, may yet be enough to make the difference between a good crop and a poor one.

As the applications of fertilizers were planned to correspond to the amounts which might be applied to equal areas of grass-land, it is worth noting how the crops correspond. If we multiply the crops by 125,000 and divide by 454 to reduce grams to pounds, it appears that from the pots which received an abundance of phosphoric acid and potash, *but no nitrogen*, we harvested at the rate of 7,351 pounds per acre of air-dry crop (much dryer than ordinary hay at harvest), or 3.6 tons. Where nitrate was put on at the rate of 460 pounds per acre we harvested in one case 9,939, in the other 9,719 pounds of hay,—9,879 pounds on the average, or about 4.9 tons per acre. Of course the chance for error is large in calculating yields per acre from such small areas, but the results indicate at least that our crops were larger than could be expected from similar areas in the field.

Strict comparison cannot be made between these pot cul-

tures and meadow-land because on one hand the trials went on without break from Feb. 17th to Jan. 7th, and under conditions of temperature, illumination, and water supply that were, on the whole, more favorable than could happen out-of-doors. On the other hand, the sets at first covered but a small portion of the surface of the soil, and they have not only yielded the crops whose amounts have been stated, but they have also nearly or wholly covered the soil with turf and penetrated it extensively with their roots. Accordingly the results of this first year's growth are but partially represented in the harvested crops. In all the pots a considerable amount of soil-nitrogen has already become root and turf-nitrogen, and no doubt much of the fertilizer-nitrogen not recovered in the harvests has been appropriated by the plants and will benefit future crops. The grass is now established, and the second year of its growth may be expected to show a better effect from the fertilizers, unless it suffers for want of the resting period which grass under natural conditions experiences during our winter season.

In these tests where nitrate of soda was used at the rate of 461 pounds per acre (73 pounds of nitrogen), 90 per cent. of the fertilizer-nitrogen was recovered in the crop. From an equal amount of nitrogen in form of cotton-seed meal, 50 per cent. of the fertilizer-nitrogen was recovered, while from an equal amount of nitrogen in fine hard raw bone not more than 5.0 per cent. was recovered.

When half the quantities of nitrogen named above were used the following percentages of the fertilizer-nitrogen were recovered in the crops: From nitrate of soda, 77 per cent., from cotton-seed meal, 66 per cent., from bone, none.

A small part of the nitrate-nitrogen, about half of the cotton-seed meal nitrogen, and nearly all of the bone-nitrogen has not been recovered in the crops. This is either in the roots of the grass which are still in the soil or it has been removed from the soil by microbe action and has passed off in gaseous form; or it is in the soil, perhaps, in available or, more likely, in rather inert forms.

As regards the inefficiency of the bone as a fertilizer it should be remembered that in these trials the hardest, most compact, and, therefore, least alterable variety of bone was purposely chosen. It is not improbable that the grass would

have done better with a considerably greater supply of water, and it is certain that a softer and more porous bone would have yielded nitrogen much more rapidly and abundantly. The result shows, however, that hard bone dust requires either to be partially rotted or steamed or else treated with sulphuric acid before applying to sandy or light-loamy soils if profitable, *i. e.*, quick returns are to be expected from its use as a fertilizer.

EXPERIMENTS IN CURING AND IN FERMENTING TOBACCO.

By E. H. Jenkins.

These experiments are in continuation of those begun in 1897, and described in the Twenty-first Report of this Station, p. 223. The cured crop of 1897 was destroyed by fire before it had been fully examined as to its quality.

In 1898 a new barn was built on the land of the Connecticut Tobacco Experiment Company, in Poquonock, where our experiments have been hitherto made.

This barn is 60 feet long, 32 feet wide, 16 feet high to the eave plates, having vertical ventilators of the usual kind, hinged just below the eaves and opening down to the sills. It also has a ventilator two feet by three in each gable end, just below the peak, with a shutter which can be closed or opened from the ground by cords. Below this ventilator there are six narrow ventilators, hinged from the top. On each end of the barn are two large doors, built in the usual way, and on one side is a small door for entering the barn during the cure. The sides and ends of the barn are battened on the inside. The lower tier of poles for hanging tobacco rests on slip-girths, so that the lath of tobacco on this tier hang crosswise of the building, like those above. The barn is built on stone and brick piers. The space between the sills and the surface of the ground is boarded up. In the center of the barn is a brick chimney — with a flue thirteen by eight inches in the clear, — which goes through the roof just to one side of the ridge pole. Except that the barn has a chimney and is made as tight as possible and battened, it is not at all unlike other barns in the neighborhood. Two stoves of heavy sheet iron, two feet eight inches from front to back, with a breadth and height of two feet four inches, each stove having a cast-iron door with draft, are used for heating the barn. One stove on each side of the barn, midway from end to end of it, is set in an excavation outside the building, the bottom of the stove being six feet below the level of the sill. Around the sides and rear end of the stove is a brick wall, having an air space of five inches closed in the front side. This wall is five inches higher than the top of the stove, iron bars are laid across it, which support a sheet-iron cover, and this, in turn, is covered with earth. On the front, near the

bottom, are openings which supply air to this air-space, which surrounds the stove except on the front and bottom.

This whole structure is three feet below the sill at its nearest point. From the stove, and through the air-space, a smoke pipe seven inches in diameter passes under the sill and into the barn straight to the chimney, having a rise of about five feet in going the distance of seventeen or eighteen feet. From the air-space, two hot-air flues, seven inches in diameter, pass into the barn, which is built with its ridge running east and west. Within the building and four feet from the south side of the barn one of these flues turns at a right angle and runs east to within four feet of the east end of the barn, thence north to within four feet of the center line of the building, and thence west till it joins the smoke pipe near the chimney. The other hot-air flue on the south side runs in a similar way to the west end of the barn and back again to the smoke pipe. The arrangement on the north side of the barn is similar. By brick supports these hot-air pipes are given a pretty uniform pitch, rising all the way from where they enter the barn to where they enter the chimney.

The hot-air flues are also connected where they enter the building, with the smoke pipe, and by the use of dampers one can send all the smoke through the smoke pipe direct, and the hot air from the hot-air chamber, through the flues; or the products of combustion can be sent through the hot-air pipes.

It is best to start the fires with direct draft to the chimney, but when the chimney has got well warmed the draft is sufficient to draw the smoke through the hot-air flues without smoking the building at all.

The pipes are numbered, and, when not in use, taken up, boards being laid down where the pipe runs below the surface of the ground and covered over with earth. After the barn is filled with the harvested tobacco the pipes can be laid in an hour's time.

In front of each stove the earth is sloped up to the general surface of the field, and boards are so placed as to prevent caving. A lean-to affords protection to the one who tends the fires. The building was inspected by the insurance companies and insured on a premium of one and one-half per cent.

The land, a little less than two acres, was dressed in the spring of 1898 with 2,000 pounds of castor pomace, plowed in early, 3,000 pounds of cotton-seed meal, and 1,600 pounds of

cotton-hull ashes applied broadcast, near planting time, and 1,000 pounds of Swift-Sure Superphosphate, put on as a "starter" in the rows just before setting time.

The crop was set about the tenth of May. The harvest generally in the state was a large one. This particular piece, however, suffered from drought, and nearly stopped growing for two weeks, when it had reached about two-thirds of its full height. Then, with abundant rain, it finished its growth, but the crop was a light one, — about 1,250 pounds per acre, — and the quality was rather poor.

It is worth noting that the dry weather immediately followed the last cultivation with the Prout hoe. If showers had followed this cultivation, the crop would have been a normal one. Or if the cultivation had been omitted, or done with a very shallow cultivator, the following dry weather would have done much less harm. The Prout hoe, when the plants were well developed, pruned the roots so much that *in a dry time* they could not supply what water the plants needed. After the plants are three feet high or more it is probably safe to till very shallow. Deep cultivation at that time, *if followed by abundant rain*, will do no harm, but if followed by dry weather may set back the growing crop. On July 29th the crop was put in the barn.

On the west half of the barn the lath were hung six inches apart, from top to bottom of the barn. On the east half they were seven inches apart on the two lower tiers and six inches on the upper ones.

On July 30th, at 4 P. M., all doors and ventilators were closed, except the two in the gable ends, and fire was started in the furnaces. The heat was well distributed by the flues, the temperature inside was brought to 80-87, while without it ranged from 69 to 74, with fog or rain.

It had been assumed that sufficient air would enter the building below through cracks between the boards and under the sills. A careful examination of the tobacco, however, on August 5th showed that, particularly near the outside on the sides and ends, the circulation was insufficient, the leaf was not drying sufficiently, and in one or two places water had condensed on the leaves. All the ventilators and doors were immediately opened, the weather being fair, and the whole was brought into good condition again. The boards below the sill

were loosened and partly or altogether left open during the rest of the curing time, as it was clear that this was necessary in order to get the necessary circulation.

The heating was then continued at evening and in unfavorable weather, but during bright, dry days it was discontinued and the barn opened, as is usually done by growers.

The leaf had all come to color by August 20th, and it only remained to dry out the "stems," or mid-ribs.

The cure was perfectly successful, with the exception of the small portion damaged as above described.

A further trial is planned in 1899, with slightly modified arrangements. Ventilators will be hung under the sills on all sides of the barn to admit air, and the ventilating capacity at the top of the barn will be somewhat increased.

Few realize the amount of evaporation which must go on in the curing barn between harvest time and the time when the leaf is pole-cured and stripped.

A single lath of tobacco, six plants, was weighed at harvest time, and every week thereafter till the tobacco was cured. From these weights is calculated the weights *per acre* of tobacco. The quantity weighed was of necessity very small, but as the results agree well with the known yield of cured leaf per acre they represent approximately the actual loss of the crop during curing.

At harvest (July 29th) there were put in the barn 24,160 pounds of tobacco plants, weight of lath not included, from one acre of tobacco; 8,000 plants.

On August	5th	this	weighed	18,495	pounds.
" "	11th	"	"	13,996	"
" "	18th	"	"	10,329	"
" "	21st	"	"	9,497	"
" September	23d	"	"	5,332	"

On the last date there were 1,499 pounds of cured leaves and 3,833 pounds of stripped stalks.

That is, twelve tons of tobacco were put into the barn, and during the cure, lasting eight weeks, more than nine tons of water, with perhaps small quantities of other matters, passed off through the ventilators as vapor. This is equivalent to 2,200 gallons, or nearly fifty barrels, holding forty-five gallons each.

Regarding the chemical changes which go on during the cure, we know very little. But it is generally agreed that to get the best results water must evaporate from the leaves not too rapidly, but continuously, without check and without chilling, which may condense drops on the leaf and thus discolor it and furnish a point for the attacks of molds or bacteria, inducing " burn " or " rot."

It is generally believed, too, that repeated drying and dampening gradually darkens the leaves, and thus makes them of less value for the present demand of the market, which requires light-colored wrappers.

Our aim is to use natural conditions when they are favorable, opening the barn on all warm, dry days, and to maintain these favorable conditions within the barn at night and in bad curing weather by means of artificial heat, never raising the temperature within beyond what it would be in the best of curing weather, but protecting the leaf from chilling, from the deposit of water on it, and from the alternate dampening and drying noted above.

The artificial heat must be so used as to maintain a current of warm air through the *whole mass* of the tobacco, and not through one part of it more than through another.

Further experiment is needed, but the results obtained this year make us confident that the use of artificial heat in some form will make the curing of tobacco less hazardous and give a better average quality of leaf.

THE FERMENTATION OF TOBACCO IN BULK.

By E. H. Jenkins.

The nature of the fermentations which take place in the curing, fermenting, and aging of leaf tobacco has been recently studied by Dr. Loew of the United States Department of Agriculture, whose conclusions are given in a report (No. 59), "On the Curing and Fermentation of Cigar Leaf Tobacco," issued by the United States Department of Agriculture.

Dr. Loew finds that, — contrary to the statements of Suchsland and others, — the fermentation of tobacco is not caused by bacteria, nor is the aroma of tobacco due to the action of specific bacteria.

Fermenting tobacco, when it has the proper content of moisture, from 18 to 25 per cent., is germicidal in its action, and few if any microbes are found on freshly fermented leaves.

The principal changes that take place in the curing and fermentation are due to the action of soluble ferments or enzymes found in the plant while growing, and perhaps while wilting after the harvest. The enzymes are chemical bodies, — not living organisms, like bacteria or molds, — which, under proper conditions, cause extensive chemical changes in bodies associated with them. A familiar example is the enzyme of malt, called diastase. Malt, by reason of this diastase, can convert many times its weight of starch into a sugar.

In the fermentation of tobacco leaf the main changes are caused by two oxidizing enzymes alone, by the agency of which the oxygen of the air is made to unite with various compounds contained in the leaf. The development of color and aroma is due principally to the action of these oxidizing enzymes.

Dr. Loew finds that one of these is no longer able to act when it is heated to 149°-151° Fahr., while the other is rendered inactive only by a much higher temperature, 188°-190° Fahr.

These observations of Dr. Loew, which it is to be hoped will be supplemented by further studies, are of the greatest interest and importance to growers and packers of leaf tobacco. It has long been known that tobacco, if packed too closely, will not ferment properly; which is readily understood if fermentation is an oxidation process, requiring the presence of

air, which too close packing almost entirely excludes. It is a question whether, under our usual methods of packing in cases, sufficient air is always present for fermentation, until by drying in the cases the leaves have shrunk somewhat, and thus admitted air.

If these enzymes or ferments are the controlling factors in fermentation, it is of importance to study their occurrence and the things which favor their presence, and especially their activity in the cured leaf.

In the Northern States wrapper leaf tobacco is, almost universally, fermented in cases. The sorted leaves, tied by their butts, with an inferior leaf, into " hands," containing from thirteen to twenty or more leaves, are carefully packed in cases, with the aid of a press, each case containing about 300 pounds. This is done during the winter and early spring, and these cases are piled three or four high in warehouses, usually unheated, where they lie over one summer. They are turned over once or twice during the time, and in the early fall samples are drawn and the cases are sold to manufacturers or dealers by the sample. It is believed that little fermentation goes on till early summer. Tobacco fermented or " sweated " in this way cannot, therefore, be sold to manufacturers till a year after harvesting.

It cannot be examined during the fermentation or " sweat " to see if it is taking damage of any kind, and the success of the process is always in doubt until it is done and the cases are stripped in the fall.

In the Southern States, in Cuba and in Sumatra, leaf tobacco is always fermented in piles or " bulks," which are constantly examined and frequently turned over and rebuilt. The skillful operator can see at once if the operation is not going as it should, and can frequently correct the trouble.

Formerly, when leaf having a dark color was in demand, Connecticut packers sometimes " forced-sweated " the leaf, which had been previously fermented in the usual way. To do this, the leaf was made as damp as was thought safe, packed again into cases, and placed in a room where a high temperature — 100°-120° Fahr. — was maintained. In five or six weeks the process was complete.

During the last two years, owing to the scarcity of fermented wrapper leaf in the market, packers have hastened the

fermentation of new-crop leaf by placing the cases, packed as usual, in rooms heated to 90°, 100°, or even to 130° Fahr. — depending on the packer's idea of what might be most favorable. Some have kept the air of these rooms quite moist, the relative humidity being 80 per cent.

In this way the leaf could be put on the market in six or eight weeks from the time it was packed. It is too early to decide whether as fine a quality of leaf is secured in this way as by the old-fashioned and slower method.

In order to test the method of fermenting Connecticut wrapper leaf by the process used at the South, i. e., in a heap instead of in a case, the crop described in the previous paper, page 299, was fermented in the following way:

A basement room was used for the purpose, the temperature of which was about 80° Fahr. day and night, because of a main steam pipe which passes through it to another building. By means of live steam from a pet cock on this pipe, the temperature could be raised to 90° Fahr. or more, and the air made very moist. By means of maximum and minimum thermometers and a hygrometer the heat and moisture could be watched, and with the aid of steam and occasional sprinkling of floor and walls kept quite uniform.

On November 1st a bulk was made as follows: On the cement floor were laid damp tobacco stems covered with trash tobacco, well pressed down, making a layer five inches deep. At each end were stanchions to hold the bulk, and matched planed pine boards were put against them, next the tobacco. About 930 pounds of tobacco, 314 pounds of top leaves, and 616 pounds of seconds (bottom, "sand" leaves), all tied in hands, were piled up between the stanchions, just as they are laid in a case, the butts to the side of the bulk.

The whole made a pile about five feet high. The top leaves were judged to be in good condition for fermenting; the seconds were too dry, but we preferred not to apply moisture till we had some experience with the process.

Near the bottom, center, and top of this bulk, as it was built, were laid electrical thermometers, devised by Whitney and Evans and kindly loaned to us for the purpose by Professor Whitney, chief of the Division of Soils, United States Department of Agriculture. By this means, with a special telephone instrument, the temperature can be taken at any time without

disturbing the bulk at all. The top and sides of the bulk were covered with stems and trash tobacco, held in place by a few scantling.

During the fermentation the temperature of the room averaged 82°, and after a few days' experience in regulating it, ranged from 77° to 85°. The relative humidity averaged 80 per cent., ranging from 75 to 91.

The temperature of the top of the bulk rose to 100° Fahr. in nine days, or at the rate of four degrees in twenty-four hours. The temperature of the center rose to 102° Fahr. in the same time, at the rate of four and one-half degrees in twenty-four hours. The temperature at the bottom in the same time rose to 79° Fahr., or less than two degrees per day.

Very soon after the tobacco has become warm by reason of the fermentation, it develops a very characteristic sweetish odor, reminding one of that of beeswax, or perhaps of plug tobacco. There is absolutely no smell of ammonia at this stage of the process, but as the temperature of the bulk goes down after the active fermentation is over the sweetish smell gradually diminishes, the tobacco within the bulk develops some ammonia, and the leaf begins to acquire the odor of fermented tobacco.

The bulk was now made over, putting what was on top before at the bottom of the new bulk. The bottom of the first bulk was at the top of the second, while the center of the first bulk was at the center of the second. The hands were shaken out to prevent the leaves from becoming matted together.

The temperature of the top of the new bulk rose to 102° Fahr. in five and one-half days, or at the rate of four degrees in twenty-four hours.

The temperature of the center, which fell to 92° in making over the bulk, rose to 98° Fahr. in four and one-half days, little more than one degree daily, while the temperature of the bottom (which had been the top of the first bulk) fell in making over the bulk to 86° Fahr., and rose to 89° in six and one-half days.

From this time, about November 18th, the temperature slowly and steadily declined till December 9th, when the temperature readings were discontinued, although the temperature and humidity of the room were kept constant. On this

date the temperature of the top and middle of the bulk was 93° Fahr., and of the bottom 85° Fahr.

This bulk stood till January 4th, when the top leaves were separated, cased, and sent to a dealer for sale. They were still quite damp, easily handled, and had lost in the fermentation only 4.4 per cent. of their weight. We are informed by the dealer that they have since lost weight considerably by drying out in the case, as was to be expected. The leaf was pronounced by him well sweated; it had lost the sweet smell so characteristic of fermenting tobacco and looked and smelled like old leaf. It had nothing peculiar about it different from leaf fermented in the usual way.

We were advised to dampen the seconds and try fermenting them further, which we did, applying *very* little moisture, and making the bulk on January 4th. The temperature rose scarcely at all, and on January 14th the leaves were made quite moist by blowing and a new bulk built. The temperature rose from 79° Fahr. to 100° Fahr. in four and one-half days, little more than four degrees per day, and then sank continuously.

On February 6th the tobacco had entirely lost its sweet smell and was giving off ammonia. It was then cased and sent away for sale.

We next undertook the fermentation of the wrappers, in the way above described. They were in rather "high case," fully as damp as was deemed safe, and contained 27.5 per cent. of water.

The bulk contained 1,305 pounds, and was built January 13, 1899. The top and sides of this bulk were covered with woolen blankets, two-inch plank being laid on top of the bulk, and the whole pressed down by the weight of several persons. The temperature of the room averaged about 85° and the relative humidity 85 per cent. during the first two weeks, and from then on the temperature averaged 80° Fahr., and relative humidity 70 to 75 per cent. The temperature of the tobacco in the bulk was as follows:

	Jan. 13.	Jan. 18.	Increase.	Increase per Day.
Top of bulk,	71°	93°	22°	4 ½°
Center of bulk,	65°	91°	26°	5°
Bottom of bulk,	68°	82°	14°	3°

On the 18th the bulk was built over, putting at the bottom

of the new bulk what had been at the top of the first one, and shaking out the leaves which were inclined to mat together.

The temperature record of this bulk was as follows:

	Jan. 18.	Jan. 24	Increase.	Increase per Day.
Top of bulk,	84°	98°	14°	4°
Center of bulk,	86°	99°	13°	4°
Bottom of bulk,	89°	91°	2°	..

On the 27th mold was found on a few hands next the blanket, on the top of the bulk where the blanket had been wet, and fearing there was more beneath, the bulk was again made over. No more mold was found.

The temperature changes from this time on were as follows:

	Jan. 27.	Feb. 6.	Increase.	Increase per Day.
Top of bulk,	82°	95°	13°	1.3°
Center of bulk,	83°	93°	10°	1.0°
Bottom of bulk,	84°	81°	—3°	....

From February 6th the temperature steadily and slowly declined throughout the bulk. On February 27th the bottom temperature was 78°, the center 84°, and the top 89°. The air of the fermenting room was then allowed to cool gradually to 70°, and became dryer as the tobacco was pronounced well sweated.

The tobacco remained in this bulk until March 27th, when it was cased and shipped. At this time it had nearly lost the characteristic sweet smell of fermenting tobacco, and had a slight smell of ammonia. During the fermentation it lost about 8 per cent. of its weight.

The leaf was examined by a dealer in leaf tobacco, and by a cigar manufacturer, both of whom found it "well-sweated," not distinguishable from leaf fermented by the usual methods, and having an odor of old tobacco, quite different from the leaf which had been fermented at a high temperature in cases.

These observations indicate that high temperatures, 120°-130°, are not at all necessary for the rapid fermentation of tobacco, and that our Connecticut leaf will ferment perfectly well in piles instead of cases, and when the process is complete, will be moist enough to be readily handled and cased down.

ANALYSES OF FEEDS.

The following feeds have been examined by Messrs. Winton, Ogden, and Mitchell, at the request of those named below, who have sent the samples to the Station:

10847. Blatchford's Calf Meal, made by E. W. Blatchford & Co., Chicago. Sent for microscopic examination by the Maine Agricultural Station. Mr. Winton found it to contain a large proportion of linseed meal; bean products (hulls and starch identified), wheat (wheat starch and hairs identified), and fenugreek were also found.

Dr. Woods states that the sample has the following composition:

Water,	7.70
Ash,	5.46
Protein,	25.63
Fiber,	5.28
Nitrogen-free Extract,	50.37
Fat,	5.56
	100.00

Of two samples of "wheat-flour" sent by Dr. B. W. Kilgore, State chemist of Mississippi, one was found by Mr. Winton to consist wholly of wheat, the other contained a large quantity of corn starch.

10231. Chicago Gluten Feed. Stock of B. B. Broadbent, Hamden Plains. Sampled and sent by John B. Phelps, Hamden.

10823. Gluten Feed, sent by Charles M. Jarvis, East Berlin.

10229. The H. O. Co.'s Dairy Feed. Stock of R. G. Davis, New Haven. Sampled and sent by E. A. Bradley, Hamden.

10230. Quaker Oat Feed. Stock of Abner Hendee, New Haven. Sampled and sent by E. A. Bradley, Hamden.

10155. Chaff. Sent by A. N. Farnham, New Haven.

ANALYSES.

	Chicago Gluten Feed. 10,231.	Gluten Feed. 10,823.	H. O. Dairy Feed. 10,229.	Quaker Oat Feed. 10,230.	Chaff. 10,155.
Water,	6.81	10 45	6.14	5.74	7 41
Ash,	.95	2.81	4.57	5.40	10.02
Protein,	23.88	14.81	20.38	11.75	7.75
Fiber,	7.26	7 94	12.29	11.44	24.95
Nitrogen-free Extract,	56.11	53 96	52.00	61.64	47.52
Fat (Ether Extract),	4 99	10.03	4.62	4 03	2 35
	100.00	100.00	100.00	100.00	100.00

WATER-FREE.

Ash,	1.02	3.14	4.87	5 73	10.82
Protein,	25.63	16.55	21.71	12.47	8 37
Fiber,	7.79	8.87	13.09	12.14	26.95
Nitrogen-free Extract,	60.21	60.24	55 41	65.39	51.32
Fat (Ether Extract),	5 35	11.20	4 92	4.27	2.54
	100 00	100 00	100.00	100.00	100.00

A large number of " Feeds " are now on the market, being residues or by-products from some manufacture. Thus the gluten feeds are by-products of starch and glucose manufacture; H. O. Feed and Quaker Oat Feed come from factories where certain " breakfast foods " are prepared. The first question with the feeder should be, are they concentrated feeds, containing decidedly more nitrogenous matter, protein, than belongs to corn-meal? If not, it seldom if ever pays to buy them. The feeder should raise his own ensilage, corn fodder and corn-meal. The use of boughten feeds is to supplement home-grown products by increasing the *proportion* of digestible protein in the ration. This cannot be done with feeds which, like corn meal, contain no more than ten or eleven per cent. of protein. If the prepared feeds do not contain more protein than wheat bran, sixteen to eighteen per cent., it is still a question whether it will not pay better to buy a standard article, like wheat bran, which has been thoroughly proved in dairy practice, than to try these new preparations.

TESTS OF THE VITALITY OF VEGETABLE SEEDS.

By E. H. Jenkins.

Since November, 1897, three hundred and thirty-three samples of seed have been examined as to their vitality. This work has been done chiefly in the interest of seed growers and seed dealers in this State, and has been executed for the most part by Mr. V. L. Churchill.

The methods of testing adopted by the Association of American Agricultural Colleges and Experiment Stations have been closely followed, and the standard germinating chambers have been used.

Table I presents the average, maximum and minimum vitality of all the seeds tested at the Station by the newly adopted methods. The age of the seeds given in the table is that reported by the seedsmen or growers who sent the samples. The samples were in all cases drawn by the persons sending them. Since the samples were sent by the seedsmen for their own information, and it was understood that the results of the tests were not to be published as representing the character of their goods, there was no motive for any misrepresentation as to the age of the seed. The samples for the most part undoubtedly represented cleaned seed as prepared for market.

TABLE I. — GERMINATION TESTS OF VEGETABLE SEEDS

	Age of Seed in years, when tested.	Number of Samples.	Average Percentage by number of Seed Sprouting	Maximum.	Minimum.
Beans,	0–1	7	86 5	100.0	56.7
	1–2	15	91.1	100.0	72.0
	2–3	8	87.0	100.0	59.0
	3–4	15	92.3	99.0	83.0
Beets,	0–1	18	162.0	211.0	65.5
	1–2	13	175.7	230.0	120.5
	2–3	4	146.6	192.0	73.5
Brussels Sprouts,	3–4	1	36.0	....	....
Cabbage,	0–1	23	80.9	94.0	44.0
	1–2	9	78.4	96.5	38.8
	2–3	3	71.5	88.0	43.0
	3–4	3	74.7	91.5	55.8
	4–5	2	64.9	85.8	44.0
	6–7	1	63.8	....	....
Carrots,	0–1	19	59.5	90.8	35.0
	1–2	15	48.7	91.3	14.5
	2–3	5	43.6	54.2	31.0
Cauliflower,	0–1	1	84.5	....	....
	1–2	4	51.1	88.3	27.5
	3–4	1	77.3	....	....
Celery,	0–1	17	68.0	83.5	38.3
	1–2	7	42.9	63.8	25.3
	2–3	9	55.5	79.3	9.8
	3–4	5	55.4	63.5	27.3
Corn, Sweet,	0–1	3	93.3	99.0	83.0
	1–2	13	74.5	98.0	37.5
Cress,	0–1	3	61.5	91.3	35.5
Cucumber,	0–1	10	86.3	99.0	57.0
	1–2	8	85.9	95.5	67.5
	3–4	4	76.4	90.0	64.5
	4–5	1	79.0	....	....
Dandelion,	0–1	1	70.3	....	....
Egg Plant.	0–1	1	40.0	....	..
Kale,	...	3	85.5	92.0	78.3
Kohl Rabi,	...	2	90.1	93.5	86.8
Leek,	0–1	3	84.5	86.0	83.5
	1–2	3	76.5	79.3	74.0
	2–3	1	35.5	....	....
Lettuce,	0–1	25	90.4	100.0	18.0
	1–2	23	84.3	100.0	23.5
	2–3	11	74.3	98.8	23.8
	5–6	1	10.3	....	...
Mangel Wurzel,	0–1	2	190.0	203.0	177.0
	1–2	3	153.0	176.0	138.0
	2–3	3	131.0	181.0	101.0
Musk Melon,	0–1	8	75.4	100 0	28.0
	1–2	10	67.9	96.5	29.0
	3–4	5	45.4	81.0	19.5

TABLE I. — CONTINUED.

	Age of Seed in years when tested.	Number of Samples.	Average Percentage by number of Seed Sprouting.	Maximum.	Minimum.
Onion, Connecticut grown,	0–1	155	72.4	97.5	36.8
	1–2	31	55.5	91.5	0.8
	2–3	20	18.1	68.3	0.5
	3–4	1	59.5	....	....
California grown,	0–1	33	91.3	97.5	77.3
	1–2	9	86.5	98.0	58.5
	2–3	3	85.9	91.5	87.5
	3–4	1	10.0	....	....
Parsley,	0–1	1	73.3	....	....
	1–2	4	37.1	72.0	7.8
Parsnip,	0–1	4	52.5	63.5	34.3
	1–2	4	15.6	42.8	2.5
	2–3	1	30.3	....	....
Peas,	3–4	2	98.5	99.0	98.0
Pepper,	0–1	4	76 6	89.5	61.0
	1–2	1	29.3	....	....
Pumpkin,	0–1	5	70.7	95.0	40.0
Radish,	0–1	18	87.7	99.8	72.0
	1–2	15	67.4	87.0	31.0
	2–3	7	38.0	55.5	22.5
	3–4	10	31.6	69.5	5.3
Salsify,	0–1	1	80.5	....	....
Spinach,	0–1	14	80.7	89.7	59.5
	1–2	1	72.0	....	....
Squash,	0–1	12	84.9	100.0	68.8
	1–2	2	86.5	98.0	75 0
	3–4	5	44.4	82.0	1.0
Tomato,	0–1	8	82.8	97.0	76.0
	1–2	6	86.7	93.5	77.5
	2–3	1	65.5	....	....
	3–4	3	70.2	96.2	43.5
Turnip,	0–1	2	92.9	96.8	89.0
	1–2	4	95.8	97.8	90.5
	3–4	3	76.5	94.5	49.8
Water Melon,	0–1	7	82.7	100 0	56.3
	1–2	6	39.6	77.0	0.0
	2–3	7	43.5	81.0	0.0
	3–4	1	42.0	....	....
	5–6	1	69.5	....	....

The " percentage " of beet seed and mangel wurzel sprouting, as given in the table, is nearer 200 than 100. To test the vitality of beet seed one hundred " seeds " are put in the germinating apparatus and all the sprouts are counted. As each beet " seed " is a fruit which may contain from two to six separate seeds, it is evident that the possible number of sprouts may be 600. To count the actual number of seeds in the one hundred fruits examined, which would make a true percentage statement of sprouting power possible, would be extremely laborious ; but the form of statement here followed is sufficiently intelligible and is justified by usage.

Vitality of Onion Seed as affected by the Age of the Seed.

Since November 1, 1896, the Station has examined 110 samples of onion seed of the crops of 1896, 1897, and 1898. To these, in the following table, are added the results of tests made in previous years, by the methods recommended by the Association of Agricultural Colleges and Experiment Stations. In the samples examined, the percentage by number of seed which sprouted was as follows :

TABLE II.— VITALITY OF ONION SEED.

	Connecticut Grown		California Grown.	
	No. of Samples.	Per cent. Sprouted.	No. of Samples.	Per cent. Sprouted.
Seed stated to be less than 1 year old,	155	72.3	33	91.3
Seed stated to be between 1 and 2 years old,	31	55.6	9	86.6
Seed stated to be between 2 and 3 years old,	20	18 1	3	85.9
Seed stated to be between 3 and 4 years old,	1	59 5	1	10.0

While the number of samples examined of California-grown seed is not large enough to make a close comparison, it is quite evident that a larger percentage of the California seed germinates than of the Connecticut seed.

Table II also shows that onion seed more than one year old, as a rule, has much less sprouting capacity than new seed, although in Table V are numerous cases of onion seed more than a year old which sprout as well as most new seed.

Whether the plants produced from old seed are as vigorous and productive as those from fresh seed is quite another question, on which laboratory germination tests can give no light.

Comparison of the Vitality of Crops of Connecticut-grown Onion Seed in the years 1894–1898.

The average sprouting capacity of Connecticut-grown onion seed, as determined for a number of years at this Station, has been as follows:

TABLE III.—VITALITY OF CROPS OF ONION SEED.

	No. of Samples Tested.	Average Percentage Sprouted.
In 1880	14	87.0
1894	25	82.9
1895	13	85.5
1896	44	72 4
1897	39	77.9
1898	68	69.3

The sprouting capacity of onion seed in 1898 has been unusually low, for reasons which are not evident.

The Sprouting Capacity of Different Varieties.

The average sprouting capacity of four varieties, of which a considerable number of samples has been tested, is as follows (only those samples are here included which were alleged to be less than one year old at the time of testing):

TABLE IV.—SPROUTING CAPACITY OF DIFFERENT VARIETIES OF ONION SEED.

Variety.	No. of Samples Tested	Average Percentage of Sprouting Seed.
Yellow Globe,	77	73 9
Red Globe,	62	76 6
White Globe,	39	75.4
White Portugal,	22	68 3
Wethersfield Red,	2	72.4

Four of the varieties are essentially alike in sprouting capacity, but the White Portugal appears to be inferior to them in this regard.

In 1898 the seed of the yellow globe variety had a lower percentage vitality than either the red or white globe varieties.

TABLE V.—GERMINATION TESTS MADE IN 1898 OF ONION SEED RAISED IN CONNECTICUT.

Variety.	Station No.	Age of Seed in years, when tested.	Percentages of Seed, by Number.			No. of Days within which one-half of the Sprouting Seed Germinated.
			Sprouted in 14 days.	Remained Hard.	Decayed.	
Yellow Globe, Crop of 1895, .	1686	3–4	59.5	29.2	11.3	4
Crop of 1897, .	1685	1–2	81.8	3.2	15.0	3
Crop of 1898, .	1684	0–1	87.2	0.5	12.3	3
	1695	0–1	64.3	17.5	18.2	3
	1728	0–1	48.3	7.0	44.7	3
	1730	0–1	43.5	8.5	48.0	3
	1731	0–1	55.0	11.8	33.2	3
	1733	0–1	53.8	11.0	35.2	3
	1734	0–1	49.3	11.0	40.7	3
	1748	0–1	59.3	7.0	33.7	3
	1749	0–1	72.0	6.0	22 0	3
	1750	0–1	75.3	6.2	20.5	3
	1760	0–1	74.0	7.2	18.8	4
	1898	0–1	62.5	4.0	33.5	4
	1899	0–1	46.3	9.0	44.7	4
	1900	0–1	59.8	5.2	35.0	4
	1942	0–1	61.8	3.5	34.7	3
	1943	0–1	53.0	8.8	38.2	3
	1950	0–1	49.0	6.2	44.8	3
	1951	0–1	52.0	10.5	37.5	3
	1954	0–1	53.0	6.5	40.5	3
	1955	0–1	45.8	9.0	45.2	3
	1968	0–1	66.8	7.8	25.4	4
	1973	0–1	81.0	2.0	17.0	3
Red Globe, Crop of 1898,	1683	0–1	82.7	6.5	10.8	3
	1718	0–1	80.7	3.5	15.8	3
	1719	0–1	65.5	6.0	28.5	3
	1720	0–1	91.0	5.0	4.0	3
	1721	0–1	78.8	5.0	16.2	3
	1722	0–1	72.3	5.0	22.7	3
	1723	0–1	70.5	7.0	22.5	3
	1724	0–1	76.0	6.0	18.0	3
	1725	0–1	87.0	5.2	7.8	3
	1726	0–1	61.8	13.5	24.7	3
	1727	0–1	62.8	12.5	24.7	3
	1729	0–1	63.8	11.0	25.2	4
	1735	0–1	46.3	9.5	45.2	3
	1737	0–1	83.3	5.0	11.7	3
	1751	0–1	54.0	5.5	40.5	3
	1752	0–1	74.0	7.3	18.7	3
	1753	0–1	63.0	6.8	30.2	3
	1754	0–1	80.3	4.5	15.2	3
	1901	0–1	67.3	10.0	22.7	4
	1902	0–1	79.5	2.2	18.3	4
	1903	0–1	83.5	3.5	13.0	3
	1944	0–1	77.3	3.8	18.9	3
	1945	0–1	79.8	4.8	15.4	3
	1946	0–1	74.8	4.2	21 0	3

TABLE V.—CONTINUED

Variety.	Station No.	Age of Seed in years, when tested.	Percentages of Seed, by Number.			No. of Days within which one-half of the Sprouting Seed Germinated.
			Sprouted in 14 days.	Remained Hard.	Decayed	
Red Globe, Crop of 1898,	1947	0–1	78.0	3.2	18.8	3
	1948	0–1	67.3	10.0	22.7	3
	1949	0–1	74.8	3.0	22.2	3
	1953	0–1	82.0	2.2	15.8	3
	1970	0–1	92.0	2.8	5.2	4
	1972	0–1	64.5	8.2	27.3	3
Wethersfield Red, Crop of 1897,	1688	1–2	84.0	1.0	15.0	2
Crop of 1898,	1761	0–1	89.8	2.8	7.4	4
Early Red Flat, Crop of 1896,	1687	2–3	33.3	38.5	28.2	3
Crop of 1898,	1758	0–1	97.5	0.0	2.5	3
White Globe, Crop of 1897,	1689	1–2	38.8	39.5	21.7	3
Crop of 1898,	1682	0–1	77.0	4.8	18.2	3
	1732	0–1	66.8	5.0	28.2	3
	1736	0–1	66.5	6.0	27.5	3
	1738	0–1	56.5	11.0	33.5	3
	1739	0–1	67.0	6.7	26.3	3
	1740	0–1	61.3	8.0	30.7	3
	1755	0–1	79.8	8.8	21.4	3
	1897	0–1	73.3	6.5	20.2	4
	1944	0–1	72.3	6.8	20.9	3
	1952	0–1	68.8	5.5	25.7	3
	1969	0–1	88.5	5.2	6.3	4
	1971	0–1	67.3	4.5	28.2	3
White Portugal, Crop of 1896.	1661	2–3	18.2	31.0	50.8	5
	1662	2–3	8.2	70.0	21.8	6
	1663	2–3	0.5	48.5	51.0	10
	1664	2–3	7.7	73.0	19.3	5
	1665	2–3	11.0	53.0	36.0	5
	1666	2–3	10.3	65.5	24.2	5
	1667	2–3	2.2	58.2	39.6	4
	1668	2–3	12.0	51.5	36.5	5
	1669	2–3	38.5	33.0	28.5	4
	1670	2–3	65.0	17.5	17.5	4
	1671	2–3	3.8	81.5	14.7	6
	1672	2–3	13.0	83.0	4.0	6
	1673	2–3	6.8	78.2	15.0	4
	1675	2–3	2.5	84.5	13.0	4
	1680	2–3	6.7	74.8	18.5	5
Crop of 1898,	1681	0–1	77.8	6.0	6.2	3
	1896	0–1	79.0	5.1	15.9	4
Prize Taker, Crop of 1896.	1690	2–3	68.3	12.5	19.2	3

EGG ALBUMIN.

By Thomas B. Osborne.

Crystallized egg albumin was first observed by F. Hofmeister, whose directions for preparing it are briefly as follows (Zeitschr. f. physiol chemie, 14, 165): Fresh egg white is whipped to a froth, and after standing twenty-four hours is mixed with an equal volume of saturated solution of neutral ammonium sulphate and filtered to separate globulin. The filtrate is collected in wide, shallow dishes and allowed to evaporate at ordinary temperature for several days, or until no further precipitate of albumin appears. The substance thus deposited is re-crystallized several times from half-saturated ammonium sulphate solution, by evaporation, as before, until it is obtained in clear, acicular crystals unmixed with spheroids.

Hopkins has recently shown (Jour. Physiology, 23, 131) that the crystallization of egg albumin is greatly facilitated by the addition of acetic acid to the half-saturated ammonium sulphate solution. I have found that crystallization is thus promoted, because crystallized egg albumin is a compound of the protein substance with acid.

As Hopkins observes, when egg white is first mixed with half-saturated ammonium sulphate solution an alkaline reaction towards litmus can be detected and a decided odor of free ammonia develops. I find that after this solution has stood for some hours, all evidence of free ammonia disappears, and the solution is then perfectly neutral to litmus and continues neutral during the gradual separation of the albumin. The deposited substance, however, whether in the form of spheroids or of crystals, when filtered out and dissolved in water, reacts distinctly acid with litmus, as well as with phenolphthalein.

In order to obtain well-crystallized albumin by Hofmeister's method it is necessary to precipitate it several times, evidently because, during the first precipitations an insufficient amount of acid is formed or set free to produce the crystalline compound. It is well known that neutral aqueous solutions of ammonium salts lose ammonia and become acid when evaporated or exposed to the air.

If acetic acid be added, as Hopkins directs, all the albumin that separates is completely crystallized by a single precipitation, and that, too, without concentrating by evaporation.

I have found that if, instead of acetic acid, a molecularly equivalent quantity of hydrochloric acid be added, the separation takes place even more quickly and, so far as my experience goes, within a short time is more complete than with acetic acid during the same time.

Thus, I prepared from two equal portions of perfectly fresh egg-white a quantity of crystallized albumin by aid of each of these acids, with the following results:

One portion of 1,500 cc. of egg-white was mixed, as Hopkins directs, with an equal volume of saturated ammonium sulphate solution and filtered over night. Next morning saturated ammonium sulphate solution was added to the clear filtrate to incipient precipitation, and thereupon 46.5 cc. of 10 per cent. acetic acid were added, drop by drop, with constant shaking, and the mixture was set aside in a cold room.

The other 1,500 cc. of egg-white was similarly treated, but instead of acetic acid, 67.5 cc. of 4 per cent. hydrochloric acid, well mixed with 232.5 cc. of half-saturated ammonium sulphate solution were added very gradually, with constant agitation and formation of some permanent precipitate.

After three hours a very large crystalline precipitate had separated in the portion with hydrochloric acid. This precipitate was then filtered out, but the portion with acetic acid was allowed to stand for twenty-four hours, as the deposit appeared to be much less than that in the hydrochloric solution.

These two precipitates were each twice recrystallized, freed as completely as possible from mother liquor by pressing out with filter paper, dissolved in water, and the solutions dialyzed for ten days, until wholly freed from sulphate, when they were filtered clear and evaporated at about 50°. The residue left by the acetic acid solution (A 1) weighed 29 grams; that from the hydrochloric acid (H 1) 59 grams.

The filtrates from the several crystallizations of these two preparations yielded a second crop of crystallized albumin; that from the acetic acid solution (A 2) weighing 43 grams; that from the hydrochloric solution (H 2) 7.9 grams. Similarly, from the mother liquors from these preparations, two other entirely crystalline products were obtained, weighing respectively (A 3) 8 grams, and (H 3) 4.9 grams. From the finally remaining acetic acid solutions another preparation separated, consisting wholly of spheroids (A 4), which weighed 9.1 grams.

There were thus secured from 1,500 cc. of egg-white, by adding acetic acid, 80 grams of well crystallized albumin, and from 1,500 cc., with hydrochloric acid, 71.8 grams, or 5.3 and 4.9 grams respectively per 100 cc. of egg-white.

The crystallized albumin, like all other preparations of native proteids which I have as yet examined, is a compound of a protein substance with an acid. In order to neutralize to litmus and to phenolphthalein the solutions of one gram of each of these preparations of crystallized albumin, it was necessary to add the following quantities of decinormal potassium hydroxide solution:

	A_1.	A_2.	A_3.	A_4.	H_1.	H_2.	H_3.
To phenolphthalein,	2.05 cc.	2.30 cc.	2.30 cc	2 35 cc	2 05 cc	2.25 cc.	2.20 cc.
To litmus,	1.30 cc.	1.60 cc.	1.65 cc.	1 55 cc.	1 30 cc.	1.60 cc.	1.50 cc.
Difference,	0.75 cc.	0.70 cc.	0.65 cc.	0 80 cc.	0 75 cc.	0.65 cc.	0.70 cc.

If the molecular weight of the protein substance is assumed to be about 15,000,* one gram would react with 0.67 cc. of a decinormal solution, a quantity nearly equal to the difference in acidity shown by these two indicators. Three molecules of acid reacting with one of albumin would be equal to 2 cc. of decinormal solution per gram of albumin, a quantity in very close agreement with that found for the two large fractions A 1 and H 1), and which differs but little from that required to neutralize one gram of the other fractions.

When crystallized albumin, dissolved in water, was neutralized with decinormal potassium hydroxide, the solution evaporated to dryness and the proteid matter burned off, an ash was left containing potassium carbonate nearly equivalent to the acid of the albumin originally neutralized. From this it would appear that the acid is mostly, if not wholly, organic.

As yet I have not been able to discover what acid or acids are united to the albumin. Neutralization of the substance suspended in 50 per cent. alcohol resulted in the formation of a gummy mass difficult to filter and wash, and from which none of the products of neutralization could be separated. Neutralizing a solution of ten grams of crystallized albumin and dialysis in distilled water failed to give enough salts in the diffusate to shed light on the nature of the acid. Neutralization with

* Sabanejeff (Chem. Centrbl., (*1891*), 10.) found the molecular weight of purified egg albumin by determining the lowering of the freezing-point to be 15,000.

baryta of a solution of two grams of the albumin gave a very slight precipitate, which after standing some days was filtered out, washed, and ignited, but only four milligrams of mineral matter were obtained.

The preparations showed no excess of sulphur over that usually found in coagulated and thoroughly washed albumin prepared without the use of sulphuric acid or sulphates. Determination of total phosphorus showed A 1 and H 1 to contain 0.37 and 0.40 per cent. phosphorus pentoxide respectively. These preparations contained 0.87 and 0.69 per cent. of ash which was almost wholly insoluble in water and appeared to consist chiefly of calcium phosphate. The total phosphorus in these preparations was equivalent to 0.59 and 0.64 per cent. of tricalcium phosphate respectively.

Towards lacmoid these preparations reacted alkaline, about 1 cc. of decinormal acid being required to neutralize the solution of one gram, and 3 cc. to give an acid reaction. When one gram was treated with decinormal hydrochloric acid no evidence of free acid was shown with tropaeolin, until 8 or 9 cc. were added.

When pure water solutions containing 2.5 per cent. of my albumin preparations were heated, they all became turbid at 58°-59°, and a minute quantity of flocks separated at 59°-60°. On gradually raising the temperature the coagulum slowly increased, until at 70° much of the dissolved albumin had coagulated. The solutions heated for some time at 74° and filtered still contained a little proteid, which even on heating at 99° did not separate until some salt was added.

No break in this gradual coagulation of the albumin was detected, the solutions when filtered after partial coagulation yielding a coagulum on again heating up to the temperature to which they had been previously raised. When solutions of pure 10 per cent. sodium chloride brine containing 2.5 per cent of any of these preparations except A 3, H 3, and A 4, were slowly heated, turbidity developed at 56°-59°, and flocks at 56°-60°.

Only a trace of coagulum was obtained, however, below 64°, and the solutions filtered therefrom remained perfectly clear until heated to nearly or quite 70°, when the albumin began to coagulate. It was, however, found necessary to heat the solution to nearly 84° before most of the proteid separated.

The three preparations, A 3, H 3, and A 4, behaved as just

described, except that each yielded a relatively considerable coagulum below 64°. These preparations, it is to be noted, are final fractions obtained in small quantity, and it is probable that the coagulum obtained at 60°-64° is due to the presence of a different substance from that constituting the chief part of the other fractions. This is the more probable as A 3 and A 4 also showed a difference in specific rotation as well as in composition.

The degree of acidity has much influence on the coagulation of albumin. Exact neutralization to phenolphthalein, as might be expected, entirely prevents coagulation, even on boiling. When crystallized albumin is so far neutralized that its acidity is equal to 1.2 cc. of decinormal acid per gram of albumin, a solution containing 2.5 per cent. of the proteid becomes slightly opalescent on heating to 72°, and remains otherwise unchanged, even after heating for a long time in a boiling water bath. If, however, the acidity is but 0.1 cc. greater, or equal to 1.3 cc. per gram of albumin, the solution becomes turbid at 70° and very opaque after heating in the water bath at 99°. The difference between the two solutions is marked, and it is evident that the additional 0.1 cc. causes a change in the condition of the albumin. An acidity of 1.33 cc. per gram is almost exactly equal to two molecules of acid per molecule of albumin, assuming the latter to have a molecular weight of 15000.

From this it would seem to be necessary to add three molecules of acid to one of albumin, in order to form the coagulable substance.

The specific rotation of these preparations was approximately determined by means of a Schmidt & Haensch polariscope, using a 200 millimeter tube. The readings on the sugar scale were converted into degrees of circular polarization by multiplying by 0.346. The formula used in calculating the results is:

$$(a)_D = \frac{a \times 100}{p \times d \times l}$$

where a = observed rotation.

p = per cent of albumin in the solution.

d = density of the solution.

l = length of tube in decimeters.

The results obtained were as follows:

Preparation.	Per Cent. of Dissolved Albumin.	Solvent.	Rotation.	Average.
A1,	5.861	Water	—29° 48′	—29° 17′
	6.670	"	—28° 46′	
A2,	3.422	"	.....	—29° 23′
A3,	3.273	"	.....	—33° 3′
A4,	3.404	"	.....	—41° 45′
H1,	3.425	10 p. ct. NaCl.	—29° 0′	—28° 35′
	3.237	Water	—28° 33′	
	6.478	"	—28° 1′	
H2,	1.699	"	.....	—28° 14′
H3,	3.207	"	.....	—39° 31′

As the results obtained on A 1, A 2, H 1, and H 2 agree closely, and as these preparations represent very different proportions of the total albumin of the egg-white, it seems probable that we have in these fractions but one proteid substance.

Bondzynski and Zoja, working with solutions containing ammonium sulphate, obtained similar but somewhat lower figures for the specific rotation of their least soluble fractions, namely, 25° 8′ and 26° 2′, duplicate determinations on the same fraction. Three other fractions gave them 29° 16′, 34° 18′, and 42° 54′, figures agreeing fairly with those obtained by me for my more soluble fractions. They determined the albumin in the polarized solution by coagulation, a process not so exact as that employed by me, which consisted simply in evaporating the pure water solution, drying to constant weight at 110°, and deducting ash. A slight error in determining the dissolved albumin causes a considerable error in the specific rotation.

The effect of acid and alkali on the rotation of crystallized albumin solutions is shown by the following results, obtained by dissolving one gram of A 2 in 25 cc. of water and treating with the given quantities of acid or of alkali:

1 gram A. 2	+ nothing		—29° 17′
	+ 0.8 cc.	N/10 HCl	—29° 5′
	+ 8.0 cc.	"	—33° 46′
	+ 1.4 cc.	N/10 KOH	—28° 45′
	+ 2.7 cc.	"	—30° 20′
	+ 4.2 cc.	"	—32° 30′

It is to be noted that by 8 cc. of the acid and by 4.2 cc. of the alkali a rotation was produced about 10 per cent. higher than

with the smaller quantities of acid or alkali. This increase may well be due to a local over-reaction taking place on mixing the acid and alkali with the proteid solution, it having been demonstrated that large proportions of acids and alkalies yield products of high specific rotation.

Panormoff (Ref. in Chem. Centrbl., 1898, II., 358 and 487) has studied the specific rotation of fractionally precipitated crystallized egg albumin, and concludes that there are two albumins present in egg-white, one with a specific rotation of —23.6°, and the other —36.2°. The albumin with the lower rotation he obtains from the so-called egg globulin precipitated by adding to egg-white an equal volume of saturated ammonium sulphate solution. This he succeeded in crystallizing, and, so prepared, finds it to have the properties and composition of albumin. He considers, therefore, the egg globulin to be a compound of egg albumin with some unknown substance.

As egg-white is alkaline to litmus, and ammonia is set free on adding to it a saturated solution of ammonium sulphate, it is not surprising that a product should be produced of different solubility from that of the acid albumins which we have been considering.

Panormoff converted his crystallized albumin into a chloride by dialysis against 0.2 per cent. hydrochloric acid. He analyzed the product obtained, and it is interesting to note that, if calculated free from hydrochloric acid, the figures for the albumin are in exceedingly close agreement with the average of the best analyses of albumin. Furthermore, the proportion of hydrochloric acid in Panormoff's compound is the same as I have found albumin capable of fixing by using tropæolin as an indicator. I found that one gram of albumin unites with 8 cc. of decinormal acid, or 0.0292 gram hydrochloric acid, to form a compound showing no free acid with tropæolin, while Panormoff's chloride contained 2.92 per cent., or exactly the same quantity.

In regard to the composition of egg albumin, confusion has recently been caused by Hofmeister, who states (Ztschr. physiol. Chem., 24, 166) that he has found in repeatedly recrystallized egg albumin 1.01 and 1.18 per cent. of sulphur, and that Dr. F. N. Schulz, in his laboratory, has obtained 1.24 and 1.27 per cent.. He consequently calls in question the purity of the samples of crystallized albumin analyzed by Bondzynski and Zoja. As Hofmeister's figures for carbon are higher, and

for nitrogen lower, than those of Bondzynski and Zoja, and of other investigators who have analyzed *amorphous* egg albumin, the whole question of the composition of this substance is again thrown into confusion.

Having at hand a sample of egg albumin which had been three times recrystallized in the manner described by Hofmeister as necessary for its purification, and obtained in the same proportion from egg-white as stated by him to be the usual yield after thorough purification, and which had been coagulated with alcohol and thoroughly washed until all ammonium sulphate was removed, I analyzed it, dried at 110°, with the result given under No. 1.

Analyses of the seven fractionally crystallized preparations (A 1, 2, 3, and 4, and H 1, 2, and 3) were made after drying them to constant weight at 110°, and are as follows:

	No. 1.	H 1.	H 2.	H 3.
Carbon,	52.18	52.85	52.33	51.72
Hydrogen,	6.91	6.92	6.90	6.90
Nitrogen,	15.67	15.66	15.77	15.26
Sulphur,	1.70	1.57	1.64	1.96
Oxygen,	23.54	23.00	23.36	24.06
	100.00	100.00	100.00	100.00
Ash,	0.56	0.69	0.67	0.59
Total Phosphorus pentoxide,	.....	0.40	0.21	trace

	A 1.	A 2.	A. 3.	A. 4.
Carbon,	52.60	52.61	52.33	51.44
Hydrogen,	7.02	6.94	6.93	6.88
Nitrogen,	15.54	15.76	15.40	15.20
Sulphur,	1.61	1.61	1.78	1.91
Oxygen,	23.23	23.08	23.56	24.57
	100.00	100.00	100.00	100.00
Ash,	0.87	0.65	0.67	0.40
Total Phosphorus pentoxide,	0.37	0.28	trace	trace

There can no longer be question that the amount of sulphur in albumin is greater than that stated by Hofmeister. My sulphur determinations were made with extreme care, fusing more than a gram of the substance over an alcohol lamp with pure sodium hydroxide and peroxide in a nickel crucible, dissolving the fusion* in hydrochloric acid, nearly neutralizing

* A black substance containing sulphur (nickel sulphide) often appears which must be completely dissolved, otherwise too low results will be obtained.

the excess of acid, and precipitating with barium chloride from a boiling solution of at least 800 cc. volume. Blank determinations showed no trace of sulphur in the re-agents, and also that none was absorbed during fusion over the alcohol lamp.

These results agree with those obtained by Bondzynski and Zoja, though the difference in composition between their extreme fractions was not quite so great as found for my preparations.

The composition, rotation, heat-coagulation points, and reactions of the crystallized egg albumin obtained by aid of hydrochloric or acetic acid show this to be the same substance as that which has in the past been regarded as egg albumin.

The results of Bondzynski and Zoja, of Panormoff, and my own, make it plain that there are two protein substances in egg-white, which are commonly obtained admixed when egg albumin is prepared by the usual processes. Further work on large quantities of egg-white is already in progress here, with a view to the complete separation of these bodies.

Moerner (Zeitschr. f. physiol. Chem., 18, 525) has described ovomucoid as identical with Neumeister's pseudopeptone (Zeitschr. Biologie, 9, 369), and states that it constitutes about one-eighth of the organic matter of egg-white. Since ovomucoid is described as largely, though not wholly, precipitated by two-thirds saturation of its solution with ammonium sulphate, it ought, if present as such in egg-white, to be found among the more soluble fractions thrown down by successive additions of ammonium sulphate.

It is intended to direct especial attention to the isolation of this substance and to determine, if possible, in how far it may be admixed with the albumins.

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